TOOELE
ARMY
DEPOT

THIRD REVISED FINAL

RECORD OF DECISION
OPERABLE UNIT 8
TOOELE ARMY DEPOT
TOOELE, UTAH

Contract No. DACA31-94-D-0060
Delivery Order No. 1

Prepared for:

TOOELE ARMY DEPOT
Tooele, Utah 84074

Prepared by:

URS
Dames & Moore
200 Orchard Ridge Drive, Suite 101
Gaithersburg, Maryland 20878

DISTRIBUTION UNLIMITED
APPROVED FOR PUBLIC RELEASE

JANUARY 2004

THIRD REVISED FINAL

RECORD OF DECISION
Operable Unit 8
Tooele Army Depot
Tooele, Utah

Prepared for:

Tooele Army Depot
Tooele, Utah 84074-5000

Prepared by:

URS Group, Inc.
200 Orchard Ridge Drive, Suite 101
Gaithersburg, MD 20878

Contract No. DACA31-94-D-0060
Delivery Order No. 1

January 2004

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or relevant and appropriate requirement
bgs	Below ground surface
BRAC	Base Realignment and Closure
CAMU	Corrective Action Management Unit
CAP	Corrective Action Permit
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of concern
COPC	Contaminant of potential concern
DBHC	delta-Benzenehexachloride
2,4-DNT	2,4-Dinitrotoluene
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
FFA	Federal Facility Agreement
FRGs	Final Remediation Goals
FS	Feasibility Study
ft^2	Square foot
HI	Hazard index
HQ	Hazard quotient
IRP	Installation Restoration Program
IWL	Industrial Waste Lagoon
µg/dL	Microgram per deciliter
µg/g	Microgram per gram
NA	Not applicable
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and maintenance
OSHA	Occupational Safety and Health Administration
OSWER	Office of Solid Waste and Emergency Response

OU	Operable unit
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
RA	Risk Assessment
RAB	Restoration Advisory Board
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RfD	Reference dose
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SF	Slope factor
SWERA	Site-wide Ecological Risk Assessment
SWMU	Solid waste management unit
TBC	"To be considered" criteria
TCEDC	Tooele County Economic Development Corporation
TCLP	Toxicity characteristic leaching procedure
TEAD	Tooele Army Depot
2,4,6-TNT	2,4,6-Trinitrotoluene
TSDF	Treatment, storage, and disposal facility
UAC	Utah Administrative Code
UCL	Upper confidence limit
UDEQ	Utah Department of Environmental Quality
USACE	U.S. Army Corps of Engineers
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USRADS	Ultrasonic ranging and data system
UTL	Upper tolerance level
UXO	Unexploded ordnance
yd^3	Cubic yard

1.0 DECLARATION OF THE RECORD OF DECISION

1.1 OPERABLE UNIT NAME AND LOCATION

Tooele Army Depot (TEAD), Tooele, Utah
Operable Unit (OU) 8

1.2 STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the selected alternatives for solid waste management units (SWMUs) 6, 8, 13, 22, and 36 located within OU 8 at TEAD, Tooele, Utah. These remedial actions were chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and – to the extent practicable – the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document is based on information contained in the Administrative Record for this OU (see Section 2.3).

The U.S. Environmental Protection Agency (EPA), the U.S. Army, and the State of Utah concur with the selected alternatives.

1.3 ASSESSMENT OF OPERABLE UNITS

The response actions selected in this ROD are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 DESCRIPTION OF SELECTED ALTERNATIVES

This ROD addresses OU 8, which contains five SWMUs. The ROD for OU 4 documenting the selected alternatives (two sites located on excess BRAC property) was signed in January 2003. The RODs documenting the selected alternatives at OUs 5, 6, 7, and 10 (a total of six SWMUs) were signed in September 1994. A future ROD will document alternatives for OU 9, which contains SWMUs 7, 23, 35, and 40. OUs 1, 2, and 3 have not been used to identify groups of hazardous waste sites for remedial action up to this time, but were set aside for sites that might be identified in the future.

The selected alternatives for OU 8 are intended to ensure protection of public health and the environment from contaminants that are present in soil. The selected alternatives will comply with groundwater protection requirements at SWMUs where residual contaminants remain.

The following remedial actions address the principal threats at OU 8:

- Institutional controls at SWMUs 13, 22, and 36.

- Excavation and solidification/stabilization of contaminated soil and the application of institutional controls at SWMUs 6 and 8.

Sections 1.4.1 and 1.4.2 outline the major components of the selected remedial actions.

1.4.1 Institutional Controls

The OU 8 institutional controls include land use controls (LUCs) that will be implemented and maintained by the Army.

Objectives of the OU 8 LUCs are to – 1) Prevent residential use of the SWMU and 2) Prevent off-site transportation of soil from the SWMU. The OU 8 Remedial Design (RD) Plan for Institutional Controls summarizes the land use control objectives and mechanisms that will be used to minimize future violations of land use controls at OU 8. The land use controls shall be maintained on all land within the boundaries of SWMUs as shown in Appendix A of the OU 8 RD Plan.

The Army shall implement, maintain, monitor, report on, and enforce the land use controls according to the OU 8 RD Plan. Land Use Controls shall be maintained until the concentrations of hazardous substances in the SWMUs have been reduced to levels that allow for unlimited exposure and unrestricted use. If the Army, EPA, and UDEQ conclude that a SWMU is subsequently remediated to unrestricted use, LUCs will be removed by revising the OU 8 RD Plan and relevant mechanisms.

1.4.2 Excavation and Solidification/Stabilization

This alternative includes excavation and screening of contaminated soil, solidification/stabilization of that soil, backfilling the excavation with the clean soil, and placing the stabilized material in a corrective action management unit (CAMU). A CAMU is an area which is used for managing remediation wastes. In addition, LUCs are applied to prevent residential use of the SWMU and off-site transportation of soil from the SWMU. These LUCs are to be incorporated into RD Plan for OU8. Furthermore, U.S. Army regulations direct that all revisions to the land use plan be evaluated with regard to potential effects on human health and the environment, unauthorized future use (i.e., residential), or transfer under the Base Realignment and Closure (BRAC) Program.

In the solidification/stabilization process, cement is used to solidify and stabilize the homogenized soil. Treatment must be protective of groundwater. The stabilized soil is placed in the designated CAMU in accordance with Utah Administrative Code (UAC) R315-8-21, Use of Corrective Action Management Units. A CAMU is being designated as part of the Sanitary Landfill/Pesticide Disposal Area (SWMU 12/15), which is a

Known Releases SWMU. At SWMU 12/15, the currently proposed corrective action is a cover, groundwater monitoring, and land use controls. As part of the solidification/ stabilization remediation for SWMUs 6 and 8, a soil cover will be placed over the solidified material in the CAMU. Figures 2-2 and 2-2a show the proposed location of the CAMU.

The objective of solidification/stabilization is to treat the contaminated soil to below applicable regulatory levels. Treatability testing is required to evaluate the effectiveness of the technology and to obtain optimum design criteria. Confirmation sampling verifies the stabilization of the soil. A small amount of clean soil from an on-post borrow area is backfilled into excavated areas as needed, and the site is graded and revegetated to its original condition.

1.5 STATUTORY DETERMINATIONS

These selected alternatives are protective of human health and the environment, comply with legally applicable or relevant and appropriate Federal and State requirements, and are cost-effective. The remedies selected for SWMUs 6 and 8 use permanent solutions and treatment (or resource recovery) technologies to the maximum extent practicable. Furthermore, they satisfy the statutory preference for remedies that use treatment to reduce toxicity, mobility, or volume. The remedies for SWMUs 13, 22, and 36 require LUCs to prevent future residential use and off-site transportation of soil.

Potentially harmful substances may remain onsite at concentrations above unrestricted land use standards. For this reason, a CERCLA 121(c) review will be conducted within 5 years of commencement of the selected remedial action and repeated every 5 years to ensure that the alternative continues to provide adequate protection of human health and the environment.

Each of the alternatives outlined above is protective of human health and the environment, complies with legally applicable or relevant and appropriate Federal and State requirements, and is cost-effective.

Installation Review of Selected Remedies at Operable Unit 8

Larry McFarland Restoration Program Manager	Date
Kathy Anderson Public Affairs/Protocol Office	Date
Frank Brunson Legal Office	Date
Karol L. Ripley LTC, OD Commanding	Date

Signatures and Support Agency Acceptance of the Remedies at Operable Unit 8

James M. Paz Colonel, CM Commanding U.S. Army Environmental Center	Date
Max A. Dodson Assistant Regional Administrator U.S. Environmental Protection Agency, Region 8	Date
Dianne R. Nielson, Ph.D. Executive Director Utah Department of Environmental Quality	Date

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

TEAD is located in Tooele Valley, Tooele County, Utah, immediately west of the City of Tooele (population 13,887 (1990 census)) and approximately 35 miles southwest of Salt Lake City (Figure 2-1). The installation covers 23,473 acres; 1,700 acres (from an original 25,173) were transferred to the Tooele City Redevelopment Agency in December 1998 under the Base Realignment and Closure (BRAC) Program. The surrounding area is largely undeveloped, with the exception of Tooele, Grantsville (population 4,500, north of TEAD), and Stockton (population 400, south of TEAD). As a result of past operations at TEAD and environmental investigations since the late 1970s, 57 known or suspected waste and spill sites have been identified. These sites are referred to as SWMUs.

A Federal Facility Agreement (FFA) between the U.S. Army, EPA Region 8, and the Utah Department of Environmental Quality (UDEQ) designated 17 of the 57 SWMUs to be investigated under CERCLA. These 17 SWMUs were grouped into OUs 4 through 10. This document addresses OU 8, which contains five of the SWMUs.

OU 8 is located in the southern and western parts of TEAD. It includes five SWMUs:

- Old Burn Area (SWMU 6)
- Small Arms Firing Range (SWMU 8)
- Tire Disposal Area (SWMU 13)
- Building 1303 Washout Pond (SWMU 22)
- Old Burn Staging Area (SWMU 36).

A portion of TEAD; including the Administration Area and Maintenance Area, was transferred as part of the BRAC program in December 1998. These areas are converted from military to industrial use. These five SWMUs are not located in the BRAC parcel, and will continue to be used for military purposes. Figure 2-2 shows the locations of SWMUs at OU 8.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

As a result of past activities at the installation, TEAD was included in the U.S. Army's Installation Restoration Program (IRP) in 1978. The first component of that program was an Installation Assessment (USATHAMA, 1979), which identified a number of known or suspected waste and spill sites and recommended further investigations.

In 1984, TEAD was nominated for inclusion on the National Priorities List (NPL) because of the identified hazardous substances at some of the sites, primarily

groundwater contamination at the Industrial Waste Lagoon (IWL; SWMU 2). However, TEAD was not placed on the NPL until October 1990. In the interim, the U.S. District Court for the State of Utah issued a consent decree to TEAD for the groundwater contamination at SWMU 2. As part of being placed on the NPL, an FFA was entered into between the U.S. Army, EPA Region 8, and UDEQ in January 1991. The FFA addresses 17 SWMUs under CERCLA.

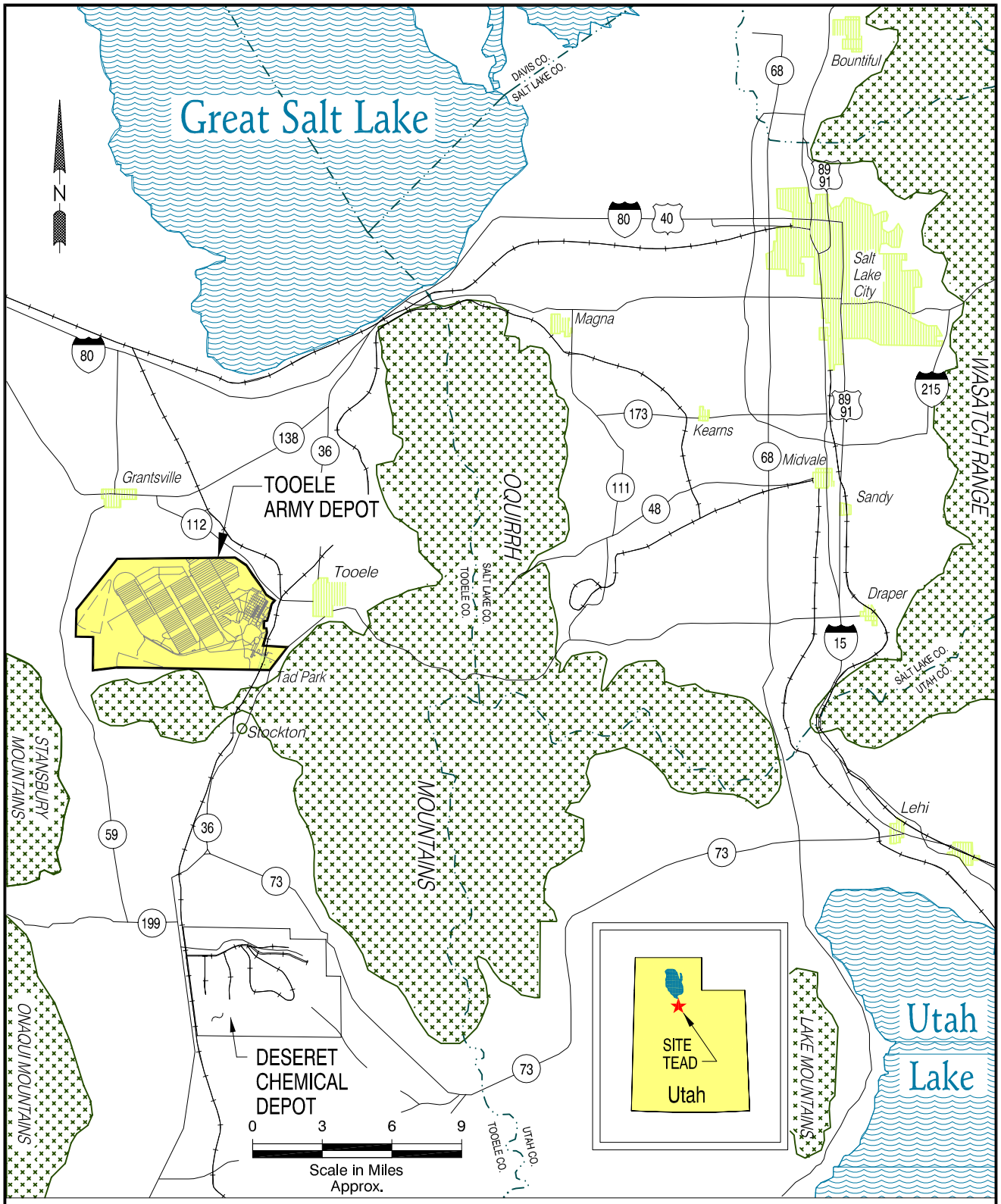
Also in January 1991, TEAD was issued a Resource Conservation and Recovery Act (RCRA) Post Closure Permit for the IWL (SWMU 2), which included a Corrective Action Permit (CAP) that required action at 29 SWMUs. Eleven more SWMUs have since been added to the RCRA CAP, which is regulated by UDEQ.

Since the initial Installation Assessment of TEAD (USATHAMA, 1979), a number of environmental investigations have been performed (and are ongoing) under CERCLA or RCRA. These additional investigations have identified 57 sites, including the 17 CERCLA sites, which were grouped into seven OUs numbered 4 through 10 (OUs 1, 2, and 3 were set aside but not designated, and have never been used). OUs 5, 6, 7, and 10 have gone through the complete CERCLA Remedial Investigation/Feasibility Study (RI/FS) process, and a ROD has been signed. The three remaining OUs (4, 8, and 9) were addressed in the initial RI (Rust E&I, 1997a); however, they required additional data collection and were separated from the RI/FS process from OUs 5, 6, 7, and 10. OUs 4 and 8 were investigated further in the Feasibility Study (FS) Report (Dames & Moore, 1999). OU 9 will be addressed in a separate FS. OU 9 contains three SWMUs; two are believed to contain unexploded ordnance (UXO). OU 9 is on a delayed program schedule until additional sampling is completed.

Section 120 of CERCLA provides guidelines for the remediation of hazardous substances released from Federal facilities. Environmental studies and remediation activities conducted at TEAD are governed by CERCLA under the review and approval of EPA Region 8 and the State of Utah (Division of Environmental Response and Remediation). The FFA specifies the responsibilities of each agency for the study and cleanup of waste sites at TEAD. It also includes a schedule for the completion of each major phase of the CERCLA process.

2.3 HIGHLIGHTS OF COMMUNITY PARTICIPATION

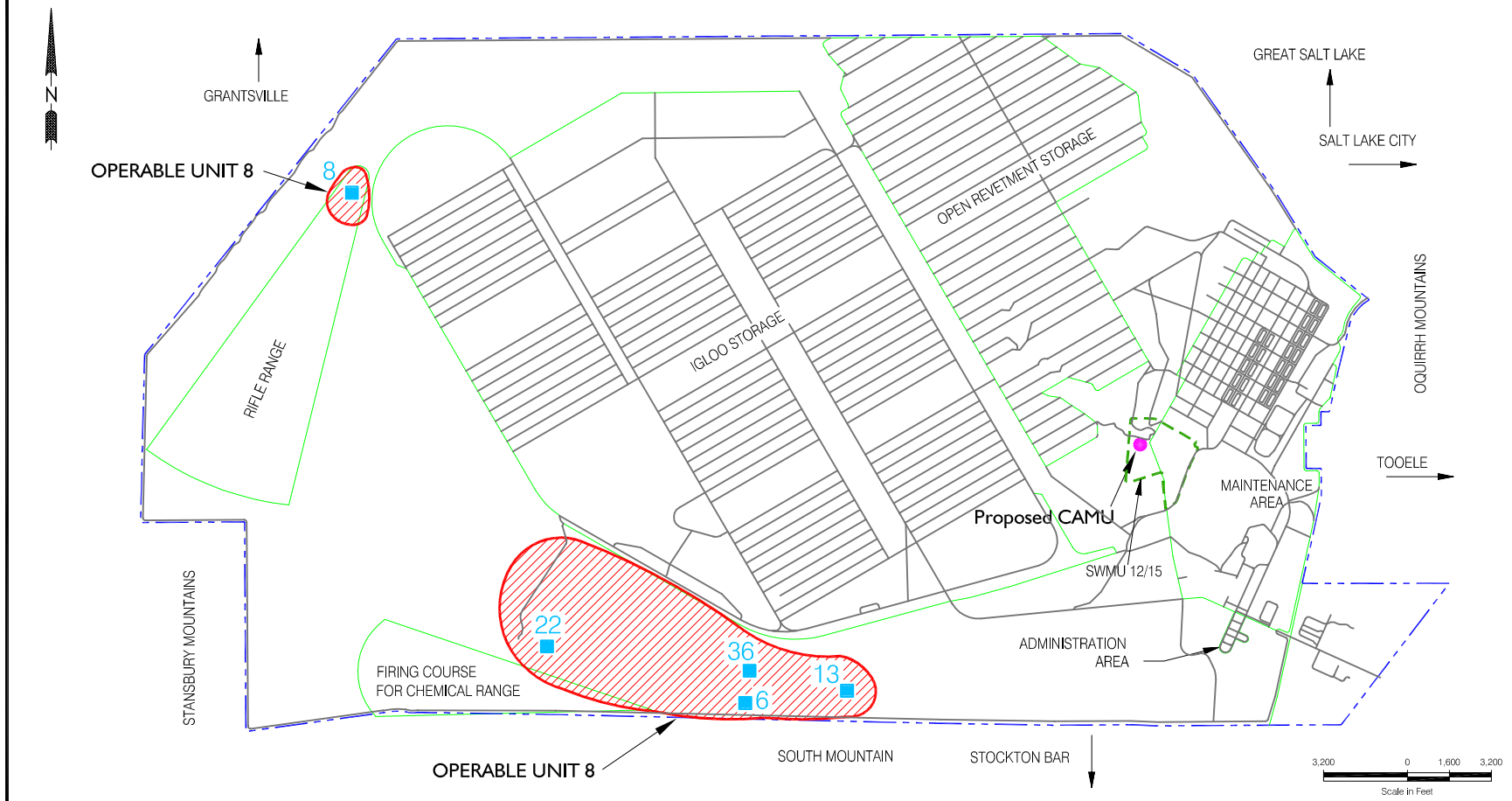
A Community Relations Plan for TEAD remedial action was completed on February 1, 1992. The plan development began in 1988 and included interviews with 24 individuals from the TEAD labor force and the local community. The Community Relations Plan is currently undergoing revision. Additional community interviews will be conducted to update the database. Technical Review committee meetings, which are open to the public, have been held locally every 3 months since February 1988 to discuss specific progress and planned cleanup activities. Currently the Restoration Advisory Board (RAB) and the technical review committee meetings are held together. Presentations and site tours are conducted upon request.



SOURCE: RUST E&I, 1995

FIGURE 2-1
LOCATION MAP OF
TOOELE ARMY DEPOT
AND VICINITY

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY



SOURCE: RUST E&I, 1997

Legend

- PROPOSED CORRECTIVE ACTION MANAGEMENT UNIT (CAMU)
- OPERABLE UNIT BOUNDARY (APPROX.)
- PROPERTY LINE
- LAND USE AREAS
- FACILITY ROADWAY

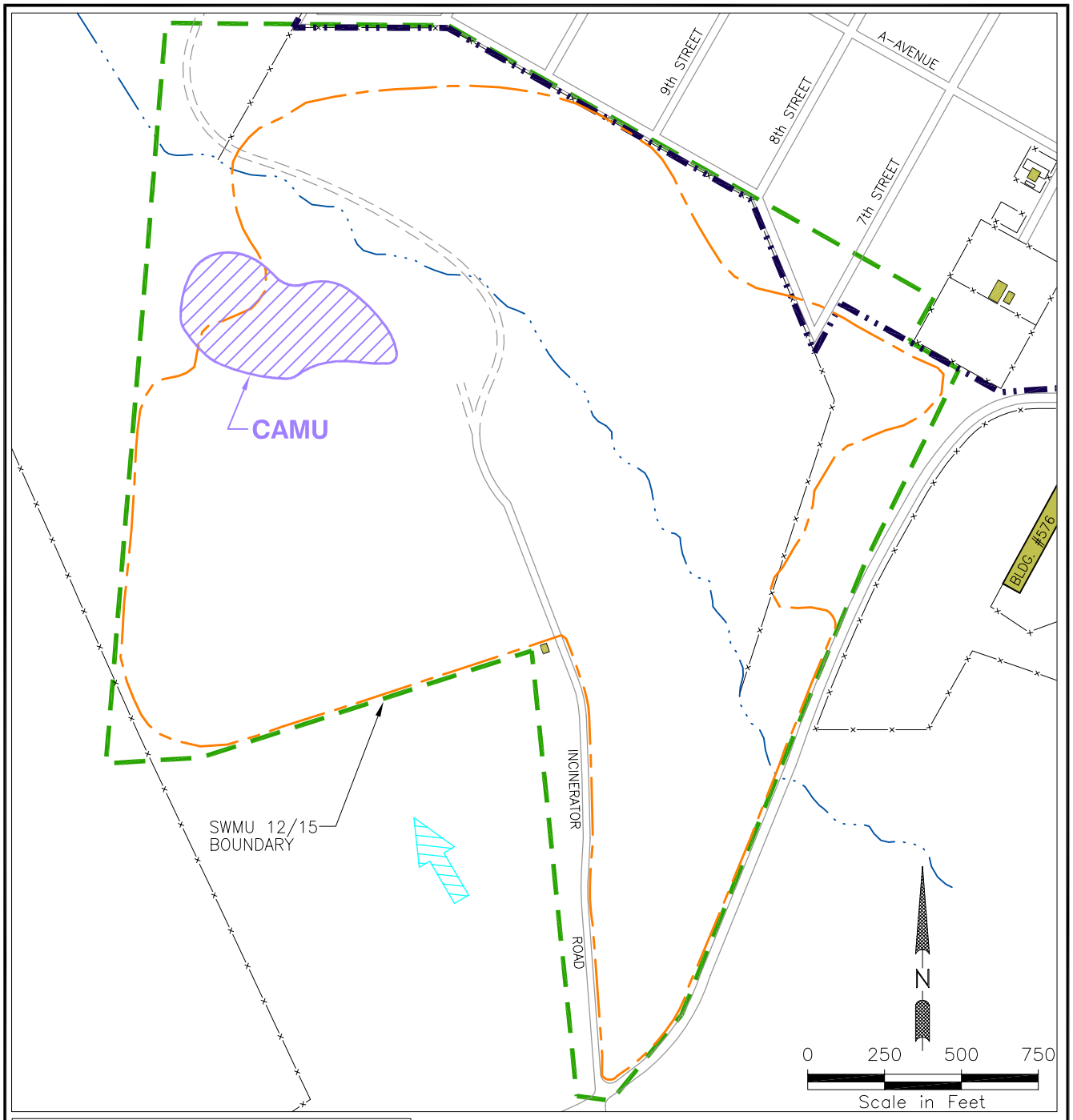
SWMUs (SOLID WASTE MANAGEMENT UNITS)

- 6 OLD BURN AREA
- 8 SMALL ARMS FIRING RANGE
- 13 TIRE DISPOSAL AREA
- 22 BUILDING 1303 WASHOUT POND
- 36 OLD BURN STAGING AREA

NOTE: SWMU 12/15 is a Known Releases site and is not a part of OU 8.

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

FIGURE 2-2
LOCATION OF SWMUs AT
OPERABLE UNIT 8
TOOELE ARMY DEPOT



DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

FIGURE 2-2a
CORRECTIVE ACTION MANAGEMENT UNIT LOCATION AT THE SANITARY LANDFILL AND PESTICIDE DISPOSAL AREA (SWMU 12/15) TOOELE ARMY DEPOT

The *Revised Final Remedial Investigation Report for Operable Units 4, 8, and 9* was released to the public on February 1997. The *Revised Final Feasibility Study Report for Operable Units 4 and 8* was released to the public on December 20, 1999. The *Proposed Plan for Operable Units 4 and 8* was released to the public on January 14, 2000. These documents are available in the Administrative Record and in information repositories maintained in the Public Affairs Office at TEAD, the Tooele Public Library, the Grantsville Public Library, and the Marriott Library at the University of Utah. The notice of availability of these documents was published in the *Deseret News* and in the *Transcript Bulletin* on January 11 and 18, 2000. A public comment period on the Proposed Plan was held from January 14, through February 14, 2000. In addition, a public meeting was held on February 1, 2000, at the Tooele County Courthouse. At this meeting, representatives from TEAD, EPA, and UDEQ answered questions about the sites and remedial alternatives. The public meeting for OUs 4 and 8 were combined. The ROD for OUs 4 and 8 were previously bound in a single volume, but for administrative purposes only, the RODs were bound separately for signature. No substantive changes were made to the text when separated. The Responsiveness Summary, which is part of this ROD, includes responses to the comments received during this period.

2.4 SCOPE OF ACTIVITIES AND ROLE OF OPERABLE UNIT 8

OU 8 consists of SWMUs 6, 8, 13, 22, and 36.

Active remediation is required only at the following SWMUs:

- Old Burn Area (SWMU 6) for lead and 2,4-dinitrotoluene (2,4-DNT) in soil.
- Small Arms Firing Range (SWMU 8) for lead in soil.

Remediation at OU 8 represents the final response action for these sites and addresses a low-level threat through the removal and treatment of contaminated soil.

2.5 SITE CHARACTERISTICS

2.5.1 SWMU 6

The Old Burn Area consists of gently sloping, grassy area with bermed revetment in the eastern portion of the SWMU. Four natural surface drainages run off the north side of SWMU 6, where they are intercepted by a manmade drainage ditch. The approximate area of SWMU 6 is 70.1 acres.

The Old Burn Area (Figure 2-3) was used for testing munitions and for burning boxes and wooden crates on the ground surface and in shallow trenches. These activities were discontinued in the 1970s. Although the trenches still contain metal debris, spent or destroyed munitions, they have been filled, graded, and revegetated. UXO personnel were present during the field investigations conducted to determine whether contamination exists as a result of the SWMUs previous activities. No UXO were found.

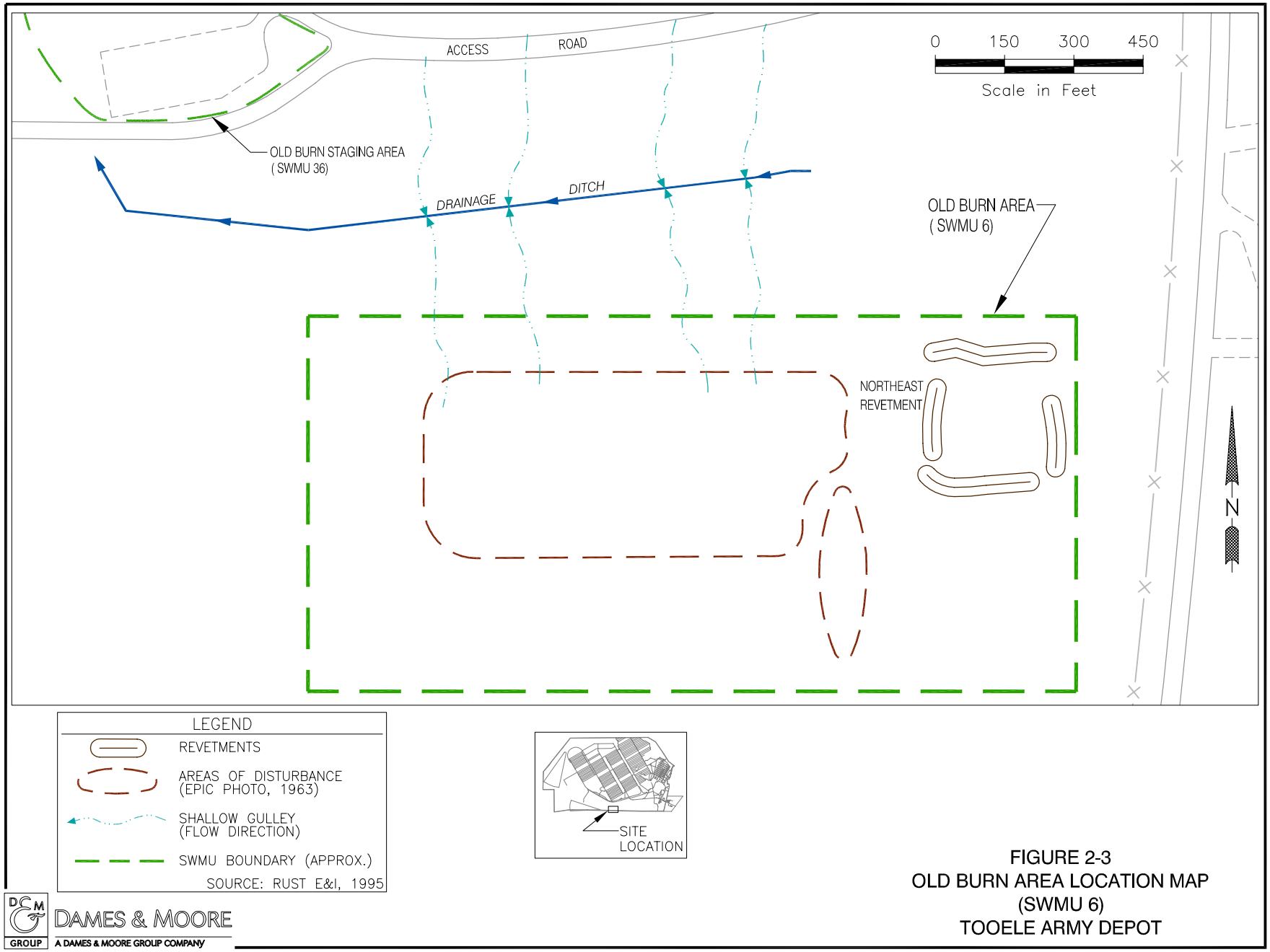


FIGURE 2-3
OLD BURN AREA LOCATION MAP
(SWMU 6)
TOOELE ARMY DEPOT

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

Low levels of metals and explosives were detected in soil samples collected from soil borings and test pits at SWMU 6. Lead was identified in a small area near one of the berms. The explosive 2,4-dinitrotoluene (2,4-DNT) was located in the drainage ditch that collects runoff from the site. Both lead and 2,4-DNT were identified as industrial COCs.

2.5.2 SWMU 8

The Small Arms Firing Range (Figure 2-4) was used through 1994 for weapons training by the National Guard, U.S. Army Reserve, U.S. Navy, and TEAD military personnel. The range contains 20 firing stations, with targets located at 25, 50, 100, and 200 meters from these stations. Bermed areas just in front of and behind the further most set of targets were used to stop the fired rounds. The approximate area of SWMU 8 is 18.9 acres.

Soil samples were collected from the earthen berms down range of the firing stations to determine whether contamination exists as a result of the fired ammunition. Several metals were identified in soil samples collected from the bermed areas. Only lead was identified as an Industrial COC at SWMU 8.

2.5.3 SWMU 13

The Tire Disposal Area (Figure 2-5) is an 11-acre pit that was used for the disposal of vehicle tires from 1965 to 1993. The tires were removed in 1995.

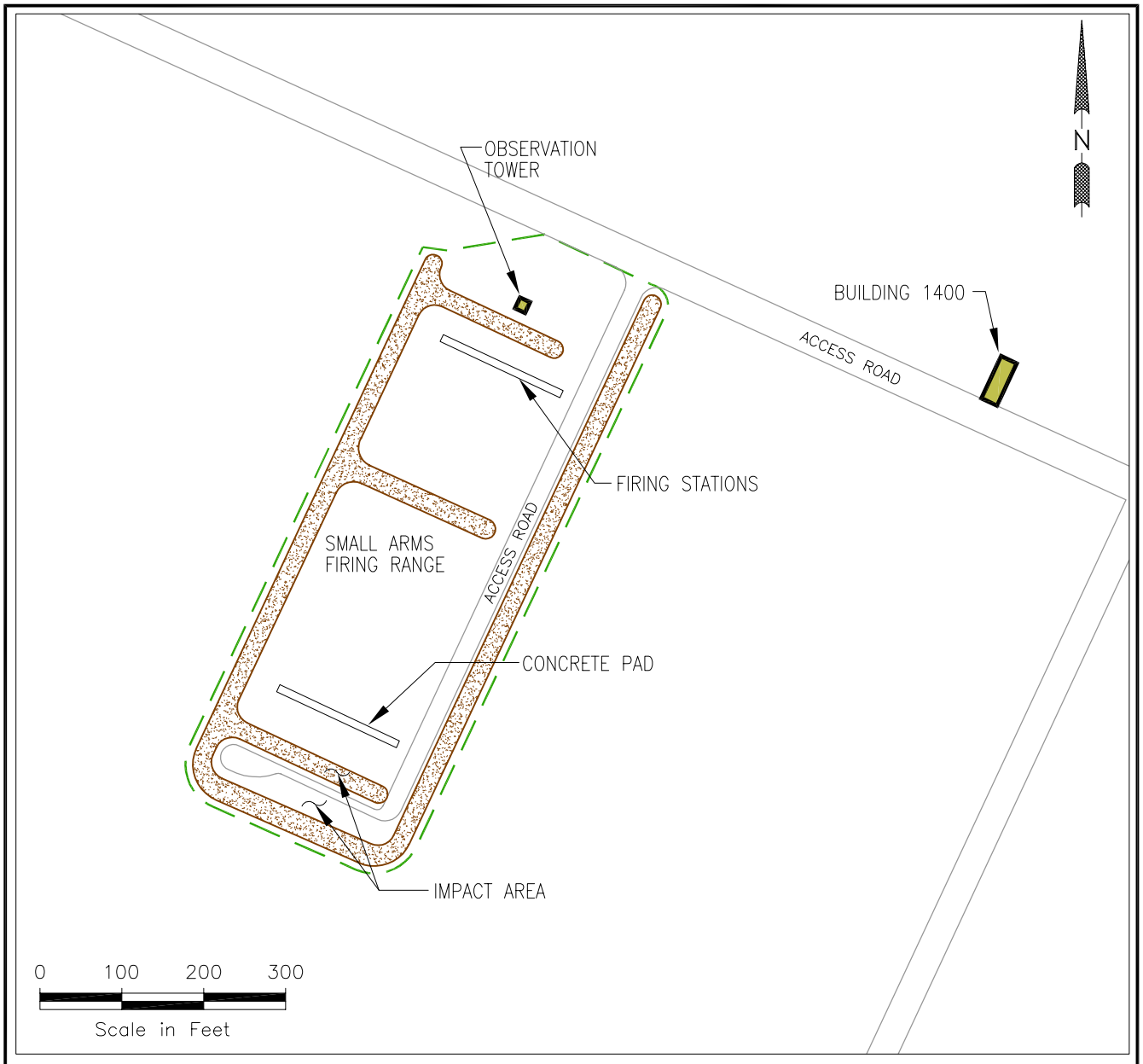
Soil samples were collected to determine whether contamination exists as a result from the tire disposal operation. Chloromethane was the only chemical detected in surface soil at SWMU 13; however, it is not an industrial COC.

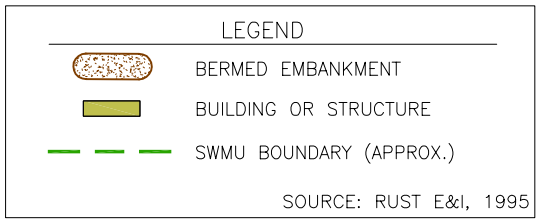
2.5.4 SWMU 22

The Building 1303 Washout Pond (Figure 2-6) is a shallow depression which received washwater from Building 1303, where high explosive bombs and projectiles were dismantled and shell casings were washed for subsequent reuse or disposal. The washwater – which likely contained explosives – drained from the building, crossed a concrete pad, entered an unlined ditch, and flowed to the ponding area. Soil samples were collected to determine whether contamination exists as a result of the washwater discharge from Building 1303. The approximate area of SWMU 22 is 0.7 acres.

During initial investigations, metals and explosives were detected in shallow soil samples collected from the unlined ditch and from the small ponding area. The explosives 2,4,6-trinitrotoluene (2,4,6-TNT) and cyclotrimethylene trinitramine (RDX) were located in one hot spot.

The Army Corps of Engineers (USACE), Sacramento District removed explosives-stained soil from the washout pond in February 1998. The pond was excavated to a depth of 2 feet. In addition, one portion of the pond (approximately 30





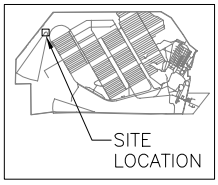


FIGURE 2-4
SMALL ARMS FIRING RANGE
LOCATION MAP (SWMU 8)
TOOELE ARMY DEPOT

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

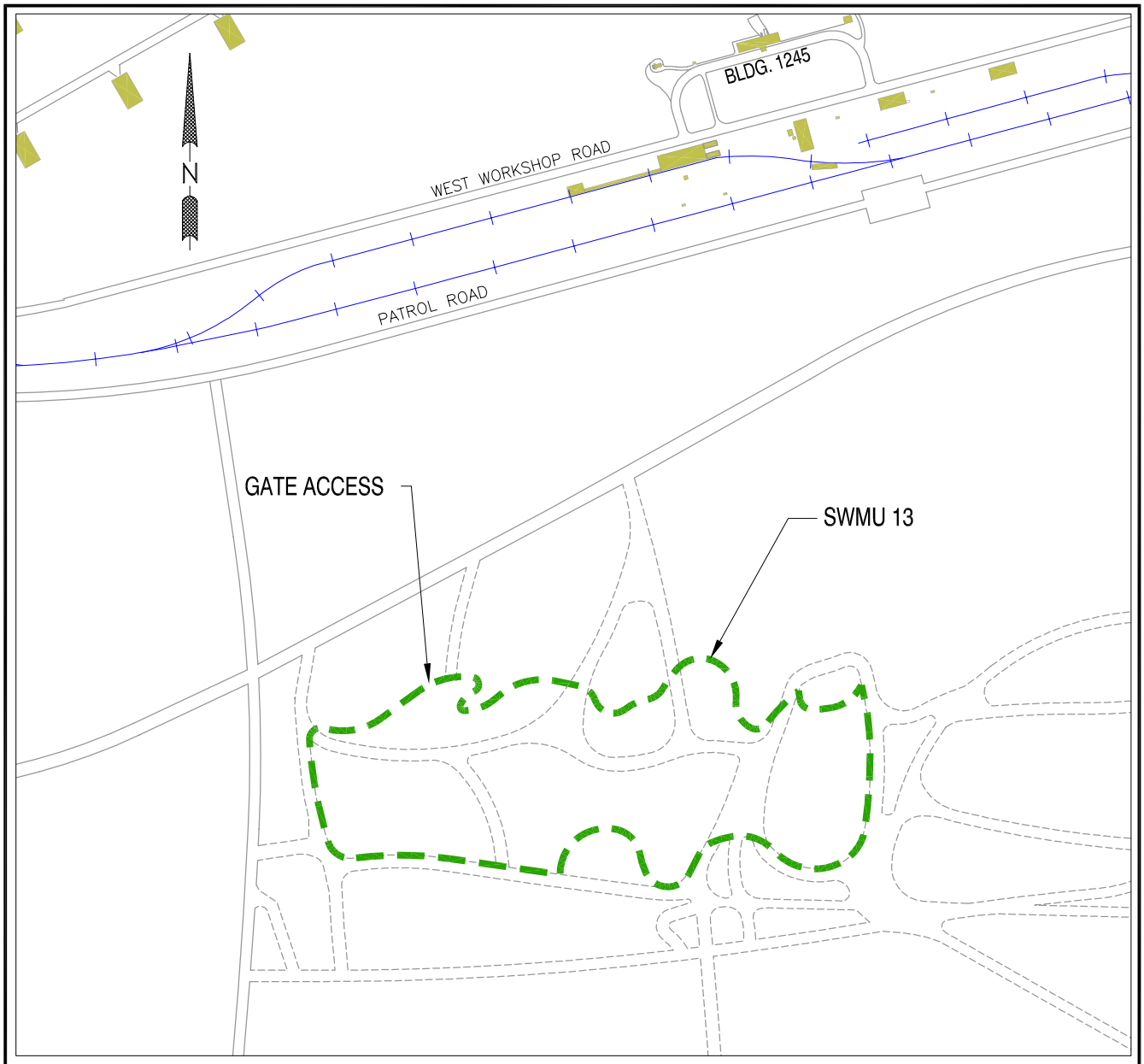


FIGURE 2-5
TIRE DISPOSAL AREA
LOCATION MAP
(SWMU 13)
TOOELE ARMY DEPOT

DAMES & MOORE GROUP
A DAMES & MOORE GROUP COMPANY

LEGEND

- DITCH
- BUILDING OR STRUCTURE
- SWMU BOUNDARY (APPROX.)
- DESERT SHRUB VEGETATION

SOURCE: RUST E&I, 1995

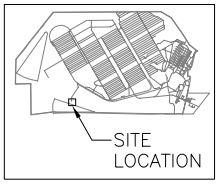


FIGURE 2-6
BUILDING 1303 WASHOUT POND
LOCATION MAP (SWMU 22)
TOOELE ARMY DEPOT

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

square feet (ft^2)) was excavated to a depth of 12 feet below ground surface (bgs). Soil was excavated and transported to an off-post TSDF for disposal by incineration. Analytical results of confirmation samples from the base of the excavation indicated concentrations below Depot worker COC levels at the site.

2.5.5 SWMU 36

The Old Burn Staging Area (Figure 2-7) is a small pit located immediately north of the Old Burn Area (SWMU 6). It was used to store items that were to be burned or disposed of at SWMU 6. Because several dark-stained areas were observed in the pit, soil samples were collected throughout SWMU 36. The approximate area of SWMU 36 is 5.3 acres.

Metals were detected in surface soil samples collected from areas of dark staining. Lead was detected in one sample at 1,900 µg/g, slightly exceeding the FRG of 1,800 µg/g.

2.6 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

2.6.1 Current Onsite Land Uses

The current onsite land use is industrial for all OU 8 SWMUs.

2.6.2 Current Adjacent/Surrounding Land Use

The SWMUs in OU 8 are located within the boundary of TEAD and, therefore, are surrounded by land that is currently industrial. The land bordering the southern Depot boundary is used for grazing.

2.6.3 Reasonably Anticipated Future Land Uses

The future land use for all SWMUs is continued industrial use. All SWMUs, regardless of their status, have the potential for construction to occur. Therefore, the future construction worker land use scenario applies to all SWMUs.

2.7 SUMMARY OF SITE RISKS

2.7.1 Summary of Human Health Risk Assessment

The baseline human health risk assessment (RA) estimates what risks the site poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the RA for each SWMU.

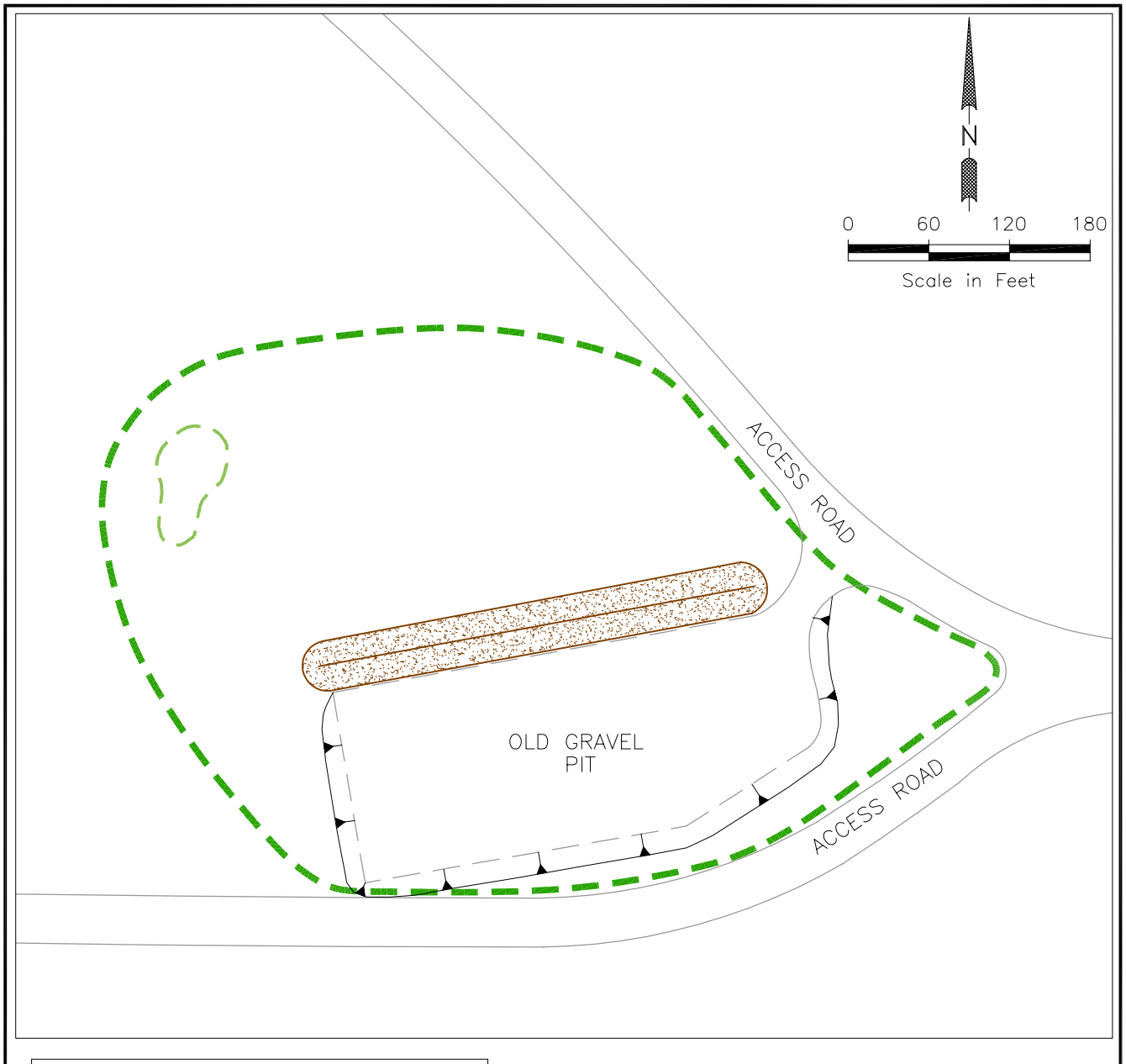


FIGURE 2-7
OLD BURN STAGING AREA
LOCATION MAP (SWMU 36)
TOOELE ARMY DEPOT

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

In accordance with EPA and State of Utah guidance, the human health RA evaluated potential cancer risks and noncancer health effects from exposure to the identified contaminants of potential concern (COPCs). Risks and effects are considered for the receptors under various exposure scenarios, including:

- Current and future Depot worker
- Current industrial worker
- Future construction worker
- Current offsite resident
- Future onsite adult resident
- Future onsite child resident.

Generally, the risks and effects to the hypothetical future onsite residents are greater than other receptors.

2.7.1.1 Definition of Cancer Risks, Noncancer Hazards, and Blood Lead Levels. The American Cancer Society has determined that the expected overall likelihood that an adult will develop cancer during a 70-year lifetime is one in three. The assessment of cancer risks for the environmental investigation at TEAD calculates the increased likelihood that an individual will develop cancer as a result of long-term site-related exposure to carcinogens over a 70-year lifetime.

EPA develops quantitative estimates of the carcinogenic potency of chemicals, which are referred to as "slope factors" (SFs). These estimates are based on long-term toxicological studies using laboratory animals or human epidemiologic data. Slope factors are used in concert with exposure scenarios to determine chemical-specific risk.

According to EPA, a calculated cancer risk is unacceptable if the increased likelihood of getting cancer is greater than one in 10,000. Furthermore, a cancer risk of less than one in 1 million is considered to be acceptable and does not require remedial action. Sites with cancer risks between one in 10,000 and one in 1 million may require further consideration to determine whether remedial action is appropriate.

The assessment of noncancer adverse health effects calculates the likelihood of risks other than cancer as a result of long-term exposure to contaminants. This is reported as a hazard index (HI) or "hazard." A calculated HI of less than 1.0 indicates that health effects expected from site-related contaminants are acceptable according to EPA standards. The chemical-specific measure of noncancer toxicity is the reference dose (RfD). RfDs are usually determined by EPA based on data from animal laboratory studies or from human studies in the workplace. The effects upon which RfDs are based may include, for example, individual weight gain or loss, organ weight changes, or changes in blood chemistry.

Blood lead levels are evaluated as a separate health effect and are treated the same as hazards. This evaluation uses an EPA model for lead uptake from the environment

(including soil) into the human body. The U.S. Centers for Disease Control and Prevention (CDC) has established a target limit for lead concentration in children of 10 micrograms per deciliter (µg/dL) of blood in less than 5 percent of the model population. When extrapolated to adults, this limit is 11.1 µg/dL. EPA recommends that this model be used when lead levels in soil equal or exceed 400 micrograms per gram of soil (µg/g).

2.7.1.2 Exposure Scenarios. Potential cancer risks and noncancer hazards are calculated for the current and future Depot worker, current industrial worker, future construction worker, current offsite resident, future adult resident, and future child resident. These receptors may be exposed to COPCs by a variety of pathways or exposure scenarios. Exposure scenarios can be real or hypothetical, current or future.

An evaluation of the hypothetical residential exposure scenario is required for all sites (UAC R315-101). This scenario calculates the risks and hazards for an adult and a child living at the identified site full-time. It is assumed that the residents are exposed to surface soil through several pathways, including:

- Getting dirt on the skin and absorbing contaminants into the body through the skin (dermal absorption).

- Eating soil directly (children) or inadvertently ingesting soil because hands are unclean (children or adults; ingestion).

- Breathing in dust (inhalation).

- Eating fruits or vegetables grown in contaminated soil (produce ingestion).

- Eating beef from cattle that have grazed on grasses growing in the contaminated soil (beef ingestion).

Using EPA exposure pathway guidelines, site-specific contaminant concentrations, and measures of contaminant toxicity, it is possible to calculate the increased likelihood of developing cancer (from carcinogenic contaminants) or being exposed to hazards (from noncarcinogenic contaminants).

Risks and hazards are also calculated for an onsite Depot worker under the industrial land use exposure scenario. This calculation assumes that exposure may occur through ingestion, inhalation, or dermal absorption of surface soil during normal work hours. The worker is not assumed to eat food produced at the site. Also, for purposes of calculating risk, the worker is at the site fewer hours per day, fewer days per year, and fewer years than the resident. These assumptions are based on EPA guidelines and on TEAD work force data.

A construction worker at any SWMU may encounter subsurface contaminated soil during utility installation, utility maintenance, or construction. This worker may be

exposed via ingestion, dermal absorption, or inhalation; however, he or she is not exposed to contaminants in food potentially produced at the site. The construction worker exposure is generally more intense (i.e., inhalation and ingestion rates of soil are higher than for the other exposure scenarios), but of a much shorter duration – which results in comparatively lower relative risks, when the same contaminant concentration is used.

2.7.1.3 Regulatory Requirements. UAC R315-101, "Cleanup Action and Risk-Based Closure Standards" – also referred to as the "Risk Rule" – is used to help determine what type of environmental action may be required.

The Risk Rule, in combination with the FFA, requires that the human health RA consider the residential exposure scenario for each SWMU even if residential use shall not occur. It also specifies the applicable exposure pathways for this scenario. Although residential use is hypothetical, it is evaluated as the scenario most protective of human health. The Risk Rule considers calculated risk for this scenario to be unacceptable if the increased likelihood of getting cancer is greater than one in 1 million above the expected rate, if the HI is greater than 1.0, or if the modeled blood lead level for children is greater than the CDC limit of 10 µg/dL.

If there are no unacceptable risks or hazards under the residential scenario and all other applicable regulatory requirements are met, the site can be closed with no further action. However, remedial alternatives must be evaluated if the residential scenario presents unacceptable risks or hazards. Because all SWMUs have a residential risk greater than the State of Utah goal of 1×10^{-6} institutional controls, at a minimum, must be evaluated.

The degree of remediation required is determined by considering the actual, reasonably anticipated future land use (i.e., continued industrial use at all OU 8 SWMUs). The Risk Rule considers the calculated risk for reasonably anticipated future land use scenarios to be unacceptable if the increased likelihood of getting cancer is greater than one in 10,000, if the HI is greater than 1.0, or if the estimated blood lead level for children is greater than the CDC limit of 10 µg/dL.

For those sites with unacceptable risks, hazards, or blood lead levels for the reasonably anticipated future land use scenario, active remedial action (e.g., excavation or treatment) is evaluated. However, if the calculated risks or health effects are acceptable and all other regulatory requirements are met, institutional controls (e.g., land use/deed restrictions, and fencing), at a minimum, are evaluated. According to the Risk Rule, the results of the ecological RA, potential effects on groundwater, and the extent and concentrations of contaminants are also considered in selecting the most appropriate remedial alternative.

A site that is determined to present an unacceptable risk or hazard for the reasonably anticipated future land use scenario is remediated to standards developed for

that scenario. These standards are less stringent for industrial, or construction use than for residential use. Thus, in these three circumstances, contaminants may remain onsite at concentrations that, though lowered, may still present risks to hypothetical future residential receptors. Therefore, institutional controls preventing residential land use are required. These residual risks are not addressed until the land use changes (e.g., if one of the SWMUs slated for continuing industrial use is transferred under BRAC). If this occurs, the risks and remedial measures must be reevaluated.

2.7.1.4 Results. As discussed above, the human health RA considered the hypothetical residential exposure scenario for the SWMUs in OU 8, even though the Army plans to use the sites in the non-BRAC parcel for continued military purposes. Under the hypothetical future residential land use scenario, cancer risks greater than one in 1 million, an HI greater than 1.0, or blood levels for children above 10 µg/dL were identified at each SWMU. These potential unacceptable risks require the evaluation of remedial measures under UAC R315-101.

At a minimum, institutional controls are required at all SWMUs, because of the residential risk. However, additional factors – including regulatory requirements and future risks – may call for remedial measures beyond management only.

To determine the extent of remedial alternatives required, the human health RA subsequently evaluated the reasonably anticipated future land use exposure scenarios, which includes industrial land use at all SWMUs in OU 8.

Under the reasonably anticipated future land use scenarios, no cancer risks greater than one in 10,000 were identified at any of the SWMUs. However, an HI above 1.0 was identified at the Old Burn Area (SWMU 6) for the construction worker exposure scenario.

Under the reasonably anticipated future land use scenarios, lead only exceeds the 11.1-µg/dL target blood lead level for construction workers at a SWMU 6 hot spot.

2.7.2 Summary of Ecological Risk Assessment

The *Final Site-Wide Ecological Risk Assessment* (SWERA; Rust E&I, 1997b) evaluated the potential effects of COPCs on plants and animals, with a focus on the areas and receptors most at risk. The following steps are included in the ecological RA process:

- Site characterization – which includes surveying site soil, plant life, and animal life.

- Identification of ecological COPCs and their concentrations and toxicity.

- Selection of ecological receptors – the species of plants and animals observed or potentially present at the SWMUs.

- Calculation of ecological effects based on available habitat, COPCs, and ecological receptors.

Potential adverse effects to ecological receptors were identified at the Small Arms Firing Range (SWMU 8). Based on these results, remedial measures are required to protect plants and animals at SWMU 8.

2.8 SUMMARY OF SWMU-SPECIFIC HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENTS

2.8.1 SWMU 6

The human health RA identified no elevated cancer risks or hazards for the Depot worker exposed to soil at SWMU 6. The table below summarizes RA results for the reasonably anticipated land use scenarios. Health effects are within the acceptable range for the Depot worker. As stated earlier, elevated cancer risks and HIs greater than 1.0 are identified for the hypothetical future onsite resident and the hypothetical future construction worker.

Summary of Potential Human Health Effects, Old Burn Area (SWMU 6)

Receptor by Area	Total Cancer Risk	Hazard Index	Blood Lead Level (µg/dL)	Recommendations
Hot Spot at Test Pit 3				Because the estimated human health risks and noncancer HIs for the current/future land use scenarios are less than the State of Utah risk goals of 1×10^{-4} and 1.0, respectively, only institutional controls are evaluated. The maximum estimated blood lead level for any receptor is less than the CDC target of 10 µg/dL for children and 11.1 µg/dL for adult workers. However, the HI for the future construction worker at the northeast revetment area exceeds 1.0, and the calculated blood lead level exceeds the CDC target of 11.1 µg/dL. For these reasons, remedial action should be considered for this area of SWMU 6.
Future construction worker	Not evaluated	0.1	Not evaluated	
Northeast Revetment Area				
Current/future onsite laborer	2×10^{-6}	0.02	2.42	
Future onsite adult resident	4×10^{-5}	4	Not evaluated	
Future onsite child resident	3×10^{-5}	4	Not evaluated	
Future construction worker	2×10^{-5}	2	3.86	
Future construction worker (a)	Not evaluated	Not evaluated	110	
Remainder of SWMU				
Current/future onsite laborer	2×10^{-6}	0.01	Not evaluated	
Future onsite adult resident	3×10^{-5}	0.2	Not evaluated	
Future onsite child resident	3×10^{-5}	0.2	Not evaluated	
SWMU 6 as a Whole				
Current/future onsite laborer	2×10^{-6}	0.01	2.42	
Current offsite adult resident	2×10^{-7}	Not evaluated	Not evaluated	
Current offsite child resident	3×10^{-7}	Not evaluated	4.5	

Summary of Potential Human Health Effects, Old Burn Area (SWMU 6)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Future onsite adult resident	3×10^{-3}	80	Not evaluated	
Future onsite child resident	Not evaluated	Not evaluated	6.4	

SOURCE: Rust E&I, 1997a.

(a) At the request of EPA Region 8, a subsurface lead hot spot within the northeast revetment area was investigated separately. The hot spot involved only three data points.

The sitewide ecological RA identified no significant adverse effects on plants or animals.

The identified blood lead level for the hypothetical future construction worker (hot spot only) is above the CDC target of 11.1 µg/dL, and requires an evaluation of active remediation. In addition, because risks and hazards are identified for the hypothetical onsite resident, the Risk Rule requires that institutional controls be evaluated for SWMU 6.

2.8.2 SWMU 8

The human health RA identified no elevated cancer risks or hazards for the Depot worker exposed to soil at SWMU 8. The table below summarizes RA results for the reasonably anticipated land use scenarios. As stated earlier, slightly elevated cancer risks were identified for the hypothetical future onsite resident and the HI is greater than 1.0 at SWMU 8. The predicted blood lead levels for the hypothetical future onsite child receptor exceed the CDC target of 10 µg/dL for children.

Summary of Potential Human Health Effects, Small Arms Firing Range (SWMU 8)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Bullet Stops				Because the estimated human health risks and noncancer HIs for the current/reasonably anticipated future land use scenarios are less than the State of Utah risk goals of 1×10^{-4} and 1.0, respectively, institutional controls are evaluated. All of the predicted blood lead concentrations are less then the CDC target of 10 µg/dL for children and 11.1 µg/dL for adult workers.
Current/future onsite laborer	1×10^{-6}	0.06	4.68	
Future onsite adult resident	3×10^{-5}	3	Not evaluated	
Future onsite child resident	2×10^{-5}	3	21.5	
Drainage Area				
Current/future onsite laborer	6×10^{-8}	0.02	Not evaluated	
Future onsite adult resident	1×10^{-7}	0.05	Not evaluated	
Future onsite child resident	2×10^{-7}	0.1	Not evaluated	
Firing Line				
Future construction worker	*$7´10^{-6}$*	*0.007*	*3.17*	
Beef From Grazing Allotment 2				
Current offsite adult resident	2×10^{-8}	0.0005	Not evaluated	

Summary of Potential Human Health Effects, Small Arms Firing Range (SWMU 8)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Current offsite child resident	2×10^{-8}	0.0008	Not evaluated	
SWMU 8 as a Whole				
Current/future onsite laborer	1×10^{-6}	0.05	2.43	
Current offsite adult resident	5×10^{-8}	0.01	Not evaluated	
Current offsite child resident	7×10^{-8}	0.03	3.70	

SOURCE: Rust E&I, 1997a.

The sitewide ecological RA identified potential adverse effects on plants and animals. Lead, the primary ecological risk driver, presents a risk to passerine birds, raptors, deer mice, and soil fauna. Naturally occurring levels of chromium and iron also contribute to the ecological risk.

Although the identified risks and hazards for the Depot worker do not exceed those allowed by EPA and the State of Utah, lead levels and potential adverse ecological effects require an evaluation of active remediation. In addition, because risks and hazards are identified for the potential onsite resident, the Risk Rule requires that institutional controls be evaluated.

2.8.3 SWMU 13

The human health RA identified no elevated cancer risks or hazards for the Depot worker exposed to soil at SWMU 13. The table below summarizes RA results for the reasonably anticipated land use scenarios. Health effects are within the acceptable range of cancer risk and below the HI of 1.0. As stated earlier, elevated risks are identified for the hypothetical future resident at SWMU 13 due to the potential ingestion of produce grown onsite in the area where chloromethane is present.

Summary of Potential Human Health Effects, Tire Disposal Area (SWMU 13)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Hot Spot at TDP-94-13				Because the estimated human health risks and noncancer HIs for the current/future land use scenarios are less than the State of Utah risk goals of 1×10^{-4} and 1.0, respectively, only institutional controls are evaluated. Blood lead levels are not evaluated because lead
Current/future onsite laborer	8×10^{-12}	2×10^{-7}	Not evaluated	
Future onsite adult resident	2×10^{-6}	0.09	Not evaluated	
Future onsite child resident	2×10^{-6}	0.2	Not evaluated	
Future construction worker	NA (a)	1×10^{-6}	Not evaluated	

Summary of Potential Human Health Effects, Tire Disposal Area (SWMU 13)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Groundwater Only at TDP-94-13 Hot Spot (b)				concentrations are well below the EPA-recommended screening level of 400 µg/g.
Future onsite adult resident	2×10^{-5}	0.8	Not evaluated	
SWMU 13 as a Whole				
Current/future onsite laborer	6×10^{-12}	2×10^{-7}	Not evaluated	

SOURCE: Rust E&I, 1997a.
(a) Not applicable because no carcinogens were COPCs.
(b) Risk results for groundwater are based on MULTIMED modeling using very conservative assumptions. Because of low contaminant concentrations, limited extent and depth of contamination, low infiltration, and subsurface retardation, no adverse impacts to groundwater are expected at SWMU 13.

The sitewide ecological RA identified no significant adverse effects on plants or animals as a result of site contaminants.

The identified risks and hazards to the Depot worker at SWMU 13 are below those specified in the Risk Rule as requiring an evaluation of active remediation. However, because elevated risks are identified for the hypothetical future onsite resident, the Risk Rule requires that institutional controls be evaluated.

2.8.4 SWMU 22

Following the USACE-Sacramento removal action, the human health RA was recalculated. The table below summarizes RA results for the reasonably anticipated land use scenarios. No elevated cancer risks or hazards are identified for the Depot worker. Health effects are within the acceptable range of cancer risk and below the HI of 1.0. Slightly elevated cancer risks and hazards are identified for the hypothetical future resident at SWMU 22 due to the potential ingestion of produce grown onsite in the area of the detected low levels of TNT.

Summary of Potential Human Health Effects, Building 1303 Washout Pond (SWMU 22)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Current/future onsite laborer	2×10^{-8}	0.003	Not evaluated	Because the estimated human health risks and noncancer HIs for the current/future land use scenario are less than the State of Utah risk goals of 1×10^{-4} and 1.0, respectively, only institutional controls are required. Blood lead levels are not evaluated because lead concentrations are well below the EPA-recommended
Future onsite adult resident	6×10^{-5}	9	Not evaluated	
Future onsite child resident	4×10^{-5}	10	Not evaluated	
Future onsite construction worker	3×10^{-6}	0.04	Not evaluated	

Summary of Potential Human Health Effects, Building 1303 Washout Pond (SWMU 22)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Future onsite adult resident exposed to groundwater (a)	4×10^{-4}	3	Not evaluated	screening level of 400 µg/g.

SOURCE: Rust E&I, 1997a.
(a) Risk results for groundwater are based on MULTIMED modeling performed prior to the voluntary interim action conducted at SWMU 22. Because the interim action significantly reduced onsite contaminant concentrations, the risk to groundwater at this site is considered to be reduced to acceptable levels.

The sitewide ecological RA identified no significant adverse effects on plants or animals as a result of site contaminants.

The identified risks and hazards to the Depot worker at SWMU 22 are below those specified in the Risk Rule as requiring an evaluation of active remediation. However, because elevated risks and hazards are identified for the hypothetical future onsite resident, the Risk Rule requires that institutional controls be evaluated.

2.8.5 SWMU 36

Cancer risks are not evaluated at SWMU 36 because no cancer-causing compounds were identified as COPCs. The table below summarizes RA results for the reasonably anticipated land use scenarios. The human health RA identified no elevated risks or hazards for the Depot worker exposed to contaminated soil. Health effects are below the HI of 1.0. For the hypothetical future onsite resident HIs are greater than 1.0. Risks and hazards were not evaluated for the future construction worker because no COPCs were identified for subsurface soil.

Summary of Potential Human Health Effects, Old Burn Staging Area (SWMU 36)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Gravel Pit Hot Spot				Because the estimated noncancer HIs for the current/future land use scenarios are less than the State of Utah goal of 1.0, only institutional controls are evaluated. Cancer risk levels are not estimated because the COPCs associated with this SWMU are
Current/future onsite laborer	NA (a)	0.02	2.39	
Future onsite adult resident	NA	5	Not evaluated	
Future onsite child resident	NA	5	Not evaluated	
SWMU 36 as a Whole				
Current/future onsite laborer	NA	0.005	2.25	

Summary of Potential Human Health Effects, Old Burn Staging Area (SWMU 36)				
Receptor by Area	**Total Cancer Risk**	**Hazard Index**	**Blood Lead Level (µg/dL)**	**Recommendations**
Current offsite child resident	Not evaluated	Not evaluated	4.5	not classified as carcinogens. The maximum estimated blood lead levels for any receptor are less than the CDC target blood lead level of 10 µg/dL for children or 11.1 µg/dL for adult workers.

SOURCE: Rust E&I, 1997a.
(a) Not applicable; no carcinogens were identified as COPCs.

The sitewide ecological RA identified no significant adverse effects on plants or animals as a result of site contaminants.

The identified hazards to the Depot worker at SWMU 36 are below those specified in the Risk Rule as requiring an evaluation of active remediation. However, because elevated hazards are identified for the hypothetical future onsite resident, the Risk Rule requires that institutional controls be evaluated.

2.9 REMEDIATION OBJECTIVES

Remedial action objectives (RAOs) consist of medium- and chemical-specific goals for protecting human health and the environment. They are used to focus the development of remedial alternatives on technologies that may achieve appropriate target levels, thereby limiting the number of alternatives analyzed. In addition, EPA guidance (Office of Solid Waste and Emergency Response (OSWER) Directive No. 9355.7-04) and U.S. Army policy (Radkiewicz, 1995) direct that RAOs should reflect the anticipated future land use to focus on developing practicable and cost-effective remedial alternatives and to streamline the environmental cleanup process.

RAOs can be specific and numerical (i.e., quantitative) or general and descriptive (i.e., qualitative). For the OU 8 SWMUs, RAOs are used to focus the development of remedial alternatives on technologies that are likely to achieve the desired target levels. The primary qualitative RAO is to protect human health and the environment. Quantitative RAOs are FRGs i.e., target cleanup goals for contaminants; they vary for each land use scenario because of different receptors and exposure pathways.

Quantitative RAOs are achieved by:

- Reducing exposure (e.g., installing a soil cover or preventing access)
- Reducing contaminant levels (e.g., active remediation; USEPA, 1988).

FRGs are used for comparison with site data to evaluate whether remedial actions are necessary, what samples/areas within a site may require remedial actions, and whether remedial alternatives are appropriate to protect human health and the environment.

FRGs for the OU 8 SWMUs are based on land use and potential receptor assumptions, exposure pathways, results of the human health RA, health effects criteria, and background sample results. They were developed in accordance with UAC R315-101, EPA guidance (USEPA, 1991), and the human health RA performed as part of the RI Addendum (Rust E&I, 1997a).

A Site-wide Ecological Risk Assessment (SWERA) was performed as part of the site investigation (Rust E&I, 1997b). Each SWMU was characterized as posing low, moderate, or unacceptable ecological risk. For those SWMUs characterized as posing a potentially unacceptable ecological risk, the SWERA recommended consideration of ecological risk reduction as part of remedial actions based on human health concerns.

The first step in evaluating remedial actions is to develop RAOs by comparing COPCs to FRGs to identify COCs for further consideration. This comparison primarily involves a quantitative screening of the maximum concentrations of COPCs detected at the SWMU and their respective FRG values. However, other issues – such as the magnitude by which a FRG is exceeded, the number of sample results that exceed the FRG, and associated uncertainties – are considered, as appropriate, during COC identification.

Three receptor populations – Depot workers, industrial workers, and construction workers – are used to evaluate potential future exposure to contaminated soil under the continued military, potential industrial, and potential construction land use scenarios at the OU 8 SWMUs. The exposure pathways evaluated for developing RAOs are inadvertent ingestion, dermal absorption of contaminants following direct contact, and inhalation of contaminants in dust. If sites that are currently considered non-BRAC are transferred under BRAC, the respective RAO scenarios may require revision.

For soil, quantitative RAOs (i.e., FRGs) – which are acceptable residual contaminant concentrations – are determined using human health RA methodology to evaluate intake by assumed exposure pathways, chemical-specific toxicity data in the form of health effects criteria, and assumed target risk level and hazard quotient (HQ).

Assumed values for risk (1×10^{-6}) and HQ (1.0) and chemical-specific toxicity data (SFs and RfDs) are used to solve for the concentration term, or the pathway-specific RAO for each chemical.

2.10 IDENTIFICATION OF FINAL REMEDIATION GOALS AND CONTAMINANTS OF CONCERN

The COPCs that exceed FRGs are site-related chemicals that are determined to be responsible for elevated risks under the reasonably anticipated future land use scenario. They are referred to as COCs.

The FRG for a chemical that may cause cancer is the concentration that results in a potential calculated risk of one in 1 million – which is much stricter than the Risk Rule's acceptable value of one in 10,000. Therefore, in some cases, COCs are identified even though the calculated risk is less than one in 10,000. The FRG for a noncancer-causing chemical is the concentration that results in an HQ of 1.0. This is equivalent to the Risk Rule's standard.

COCs are evaluated in conjunction with results of the human health RA to determine what level of remedial actions must be evaluated. The exposure point concentration (EPC) for each COC is compared to its FRG. If the EPC is less than the FRG, the maximum concentration of that chemical does not pose a human health risk. The EPC is an estimate of the concentration that a receptor is expected to encounter over long-term exposure at a site. Because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean or the maximum detected concentration is used to represent the EPC (USEPA, 1992). The EPC is not based on formal distribution testing of data, as the guidance suggests, because of the paucity of detections for surface soil and limited data for subsurface soil.

Under the reasonably anticipated future land use, no COCs were identified at SWMUs 13 and 22 (i.e., levels of contaminants onsite are below FRGs for that land use). However, COCs were identified in soil at three SWMUs, as noted below:

- Lead and 2,4-DNT at the Old Burn Area (SWMU 6; OU 8).
- Lead at the Small Arms Firing Range (SWMU 8; OU 8)
- Lead at the Old Burn Staging Area (SWMU 36; OU 8).

2.10.1 SWMU 6

Tables below compare the maximum contaminant concentrations identified in the RI Addendum (Rust E&I 1997a) for surface and subsurface soil, respectively, to the corresponding FRGs. Because the reasonably anticipated future land use is industrial, Depot worker FRGs are used for surface soil. Construction worker FRGs are used for subsurface soil. Using the maximum detected concentration of each contaminant is conservative and helps identify potential contaminant hot spots.

Identification of COCs in Surface Soil
Old Burn Area (SWMU 6)

COPCs	Maximum Concentration (µg/g)	Depot Worker FRGs (µg/g)	Surface Soil COC?
Arsenic	34	32 (a)	**Yes**
Lead	12,000	1,800	**Yes**
2,4-DNT	34	4.7	**Yes**

(a) FRG is background concentration.

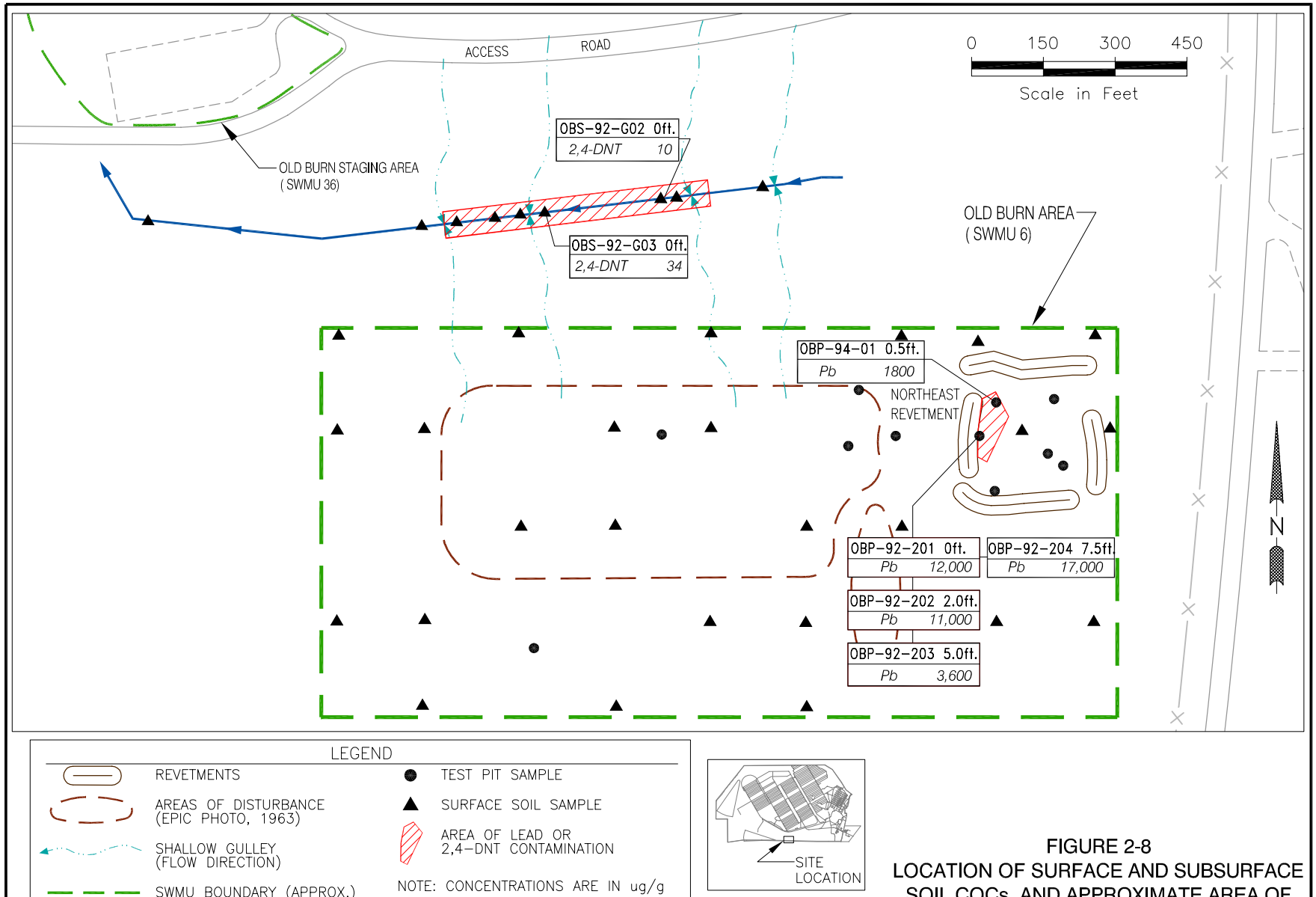
Identification of COCs in Subsurface Soil
Old Burn Area (SWMU 6)

COPCs	Maximum Concentration (µg/g)	Construction Worker FRGs (µg/g)	Subsurface Soil COC?
Arsenic	95.2	32	**Yes**
Lead	17,000	1,800	**Yes**

Based on this evaluation, arsenic, 2,4-DNT, and lead are considered to be COCs in surface soil. Arsenic and lead are COCs in subsurface soil. Figure 2-8 shows the COC locations and approximate areas of contamination. The arsenic and lead COC exceedances are in the northeast revetment area, and the 2,4-DNT exceedances are in the gully. Further evaluation of these contaminants – including consideration of the COC concentrations and distribution, and human health RA results – indicates the following:

- The elevated concentration of arsenic detected in surface soil at SWMU 6 is likely related to the variable background distribution of arsenic in soil at TEAD.

- The elevated concentration of 2,4-DNT detected in surface soil does not drive unacceptable risks under the industrial worker land use scenario.
- The elevated concentrations of lead detected in surface and subsurface soil, and the elevated concentrations of arsenic in subsurface soil, are associated within the northeast revetment area (3.3 acres).



DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

FIGURE 2-8
LOCATION OF SURFACE AND SUBSURFACE SOIL COCs, AND APPROXIMATE AREA OF CONTAMINATION
THE OLD BURN AREA (SWMU 6)
TOOELE ARMY DEPOT

The COCs identified at the site are evaluated in conjunction with results of the human health RA to determine whether remedial actions need to be evaluated based on criteria specified in State and Federal regulations. As stated in the RI Addendum (Rust E&I, 1997a), the human health RA uses the EPC to calculate human health cancer risks and HIs. To further assess the need for remedial action for identified COCs, the EPCs calculated in the RI are compared to FRGs for surface and subsurface soil:

Old Burn Area (SWMU 6)			
COC	**EPC (mg/g)**	**FRG (mg/g)**	**Area/Receptor**
Surface Soil			
Arsenic	15.8	32	Northeast revetment/Depot Worker
Lead	4,475	1,800	Northeast revetment/Depot Worker
2,4-DNT	7.74	4.7	Gully/Depot Worker
Subsurface Soil			
Arsenic	22.3	32	Northeast revetment/Construction Worker
Lead	1,548	1,800	Northeast revetment/Construction Worker

The EPCs for arsenic in both surface and subsurface soil at SWMU 6 are below the FRG for arsenic. Therefore, arsenic does not present an unacceptable risk and does not require remediation. The EPCs for lead and 2,4-DNT in surface soil exceed their FRGs by factors of approximately 2.5 and 1.6, respectively. Therefore, remedial alternatives are evaluated for lead in the entire northeast revetment area and for 2,4-DNT only in the gully.

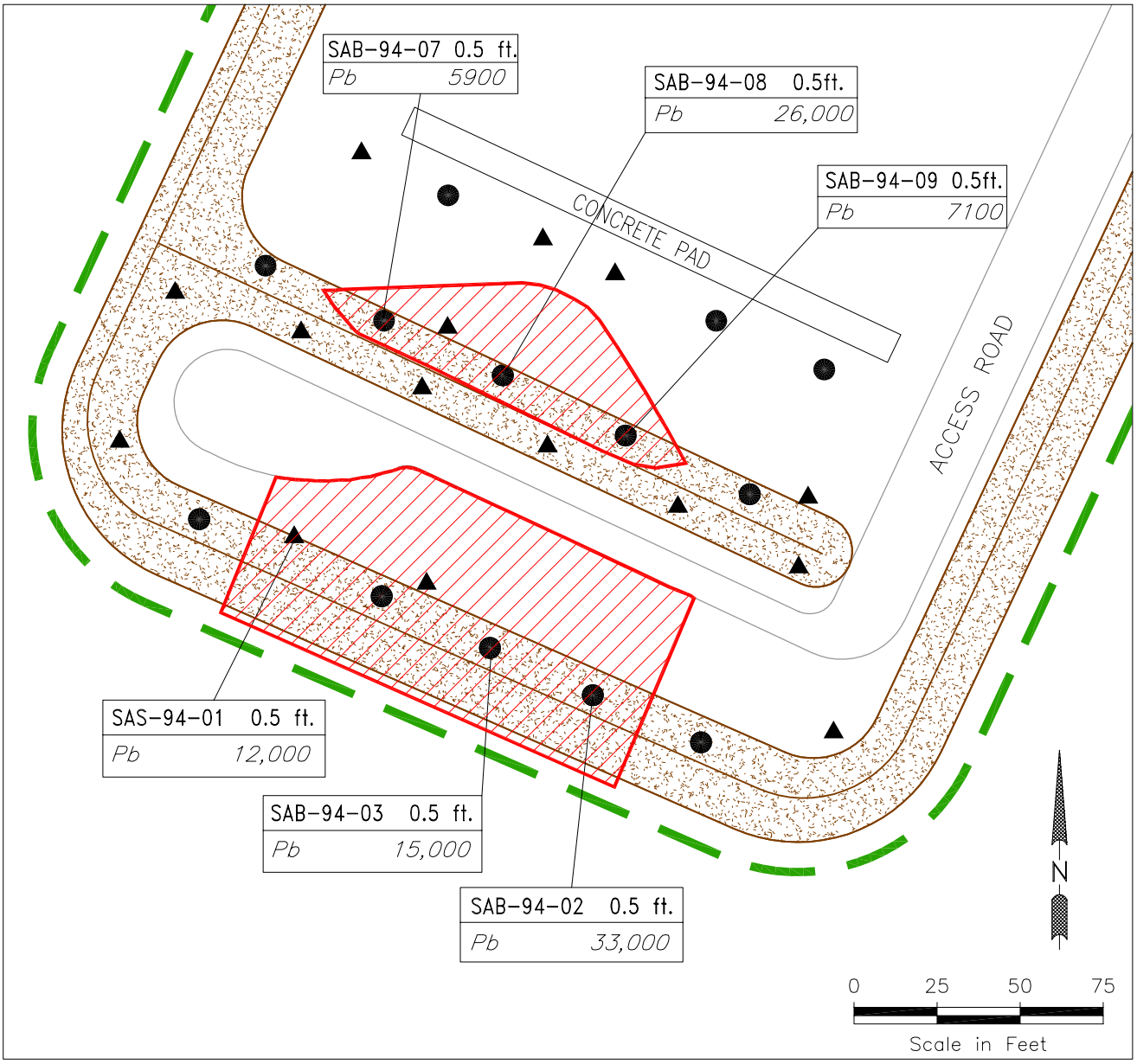
2.10.2 SWMU 8

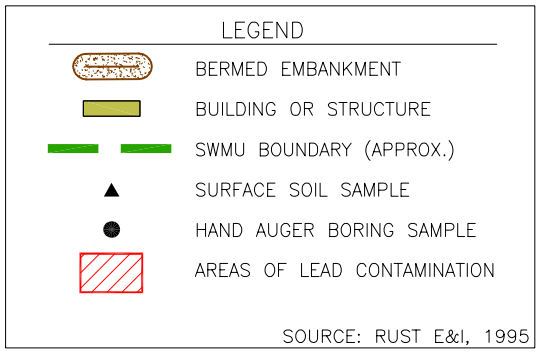
The table below compares the maximum contaminant concentrations in surface soil at SWMU 8, as identified in the RI Addendum (Rust E&I, 1997a), to the corresponding FRGs. Because the reasonably anticipated future land use is industrial, Depot worker FRGs are used for surface soil. Using the maximum concentration of each detected contaminant is conservative and helps identify potential contaminant hot spots.

Identification of COCs in Surface Soil
Small Arms Firing Range (SWMU 8)

COPCs (a)	**Maximum Concentration (µg/g)**	**Depot Worker FRGs (b) (µg/g)**	**Surface Soil COC? (c)**
Lead	33,000	1,800	***Yes***

Based on FRG screening, lead is considered to be a COC in surface soil. Lead was detected in several samples at concentrations exceeding the FRG of 1,800 µg/g, with a maximum concentration of 33,000 µg/g. Figure 2-9 shows the locations of elevated





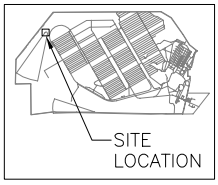


FIGURE 2-9
LOCATION OF SURFACE SOIL COCs, AND APPROXIMATE AREA OF CONTAMINATION AT THE SMALL ARMS FIRING RANGE (SWMU 8)
TOOELE ARMY DEPOT

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

lead concentrations and the approximate areas of contamination, which appear to be confined to the bullet stops. Lead shot is anticipated to penetrate to 12 inches and greater when estimating affected volume.

The COC identified at the site is evaluated in conjunction with results of the human health RA to determine whether remedial actions need to be evaluated based on compliance with State and Federal regulations. As stated in the RI Addendum (Rust E&I, 1997a), the human health RA uses the EPC to calculate human health risks and HIs as well as blood lead concentrations. To further assess the need for remedial action for lead in soil at SWMU 8, its EPC at the bullet stop area (33,000 µg/g) is compared to the FRG of 1,800 µg/g. The EPC, which, in this case, is equal to the maximum concentration, is approximately 18 times the FRG. The lead EPCs for other areas of the SWMU are well below the FRG.

The human health RA did not predict blood lead levels above the CDC target of 10 µg/dL for an onsite worker at the bullet stops area. This apparent inconsistency is due to the use of two different blood lead level models in the human health RA and in the FRG calculations. The FRG model integrates all of the RAs performed for the different SWMU groups at TEAD and incorporates updated, more realistic assumptions. Therefore, remedial alternatives are evaluated based on comparisons of lead concentrations to FRGs.

2.10.3 SWMU 36

The table below compares the maximum contaminant concentrations in surface soil at SWMU 36, as identified in the RI Addendum (Rust E&I, 1997a), to the corresponding FRGs. Lead – the only COC – was detected in only one sample, at a concentration (1,900 µg/g) slightly exceeding the FRG (1,800 µg/g). No COCs were identified in subsurface soil.

Identification of COCs in Surface Soil
Old Burn Staging Area (SWMU 36)

COPCs	Maximum Concentration (µg/g)	Depot Worker FRGs (µg/g)	Surface Soil COC?
Lead	1,900	1,800	**Yes**

The COC identified at the site is evaluated in conjunction with results of the human health RA to determine whether remedial actions need to be evaluated based on criteria specified in State and Federal regulations. As stated in the RI Addendum (Rust E&I, 1997a), the human health RA uses the EPC to calculate human health cancer risks and noncancer hazards. To further assess the need for remedial action for lead in soil at SWMU 36, the EPC calculated in the RI is compared to the FRG. The EPC for lead in surface soil at the gravel pit hot spot area is 1,900 µg/g, which is just greater than the

FRG of 1,800 µg/g. The EPCs for lead at all other portions of SWMU 36, are well below this FRG. The EPC for lead in surface soil for the site as a whole is 344 µg/g. The FRG for lead (1,800 µg/g) corresponds to a 95th percentile blood lead level of 10 µg/dL for a Depot worker. The EPC of 1,900 µg/g in the gravel pit hot spot area results in a blood lead level just greater than to the CDC target level of 10 µg/dL applicable to a Depot worker.

The human health RA predicted blood lead levels well below the CDC target level for a Depot worker at the gravel pit hot spot area. The apparent inconsistency between the results of the human health RA and the above blood lead level assessment, which is based on the EPC versus FRG comparison for lead, is due to the use of two different blood lead level models in the RI and the FRG calculations. The FRG model integrates all of the RAs performed for different groups of SWMUs at TEAD, and incorporates updated and more realistic assumptions.

In summary, the risks and HIs presented in the RI Addendum (Rust E&I, 1997a) are below State and EPA goals for the current and reasonably anticipated future land use scenarios. In addition, lead was detected at a concentration only slightly above the corresponding FRG in only one sample. Therefore, though one COC is present in an isolated surface soil sample at SWMU 36, because of its acceptable risk levels and isolation, no remedial action is recommended. However, institutional controls are evaluated, in accordance with UAC R315-101.

2.11 ALTERNATIVES EVALUATION

The FS identifies remedial action alternatives that meet the RAOs and are protective of human health and the environment. These alternatives may consist of active remediation technologies, institutional controls, or a combination of the two.

The following EPA-defined criteria are used to perform a detailed analysis of the alternatives developed for each SWMU:

- Overall protection of human health and the environment
  - Evaluates whether a remedial action alternative provides adequate protection and describes how risks are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- Compliance with applicable or relevant and appropriate requirements (ARARs)
  - Evaluates whether an alternative meets Federal and State ARARs.
- Long-term effectiveness and permanence

  - Considers the magnitude of risk posed by the site after implementation of the alternative (residual risk) and the ability of the alternative to reliably protect human health and the environment once cleanup goals (RAOs) are met.

- Reduction of toxicity, mobility, or volume through treatment

  - Evaluates the anticipated performance of a treatment technology in terms of reducing the toxicity, mobility, or volume of contamination.

- Short-term effectiveness

  - Evaluates the speed with which the alternative achieves protection (RAOs), as well as potential adverse effects on human health and the environment during construction or implementation.

- Implementability

  - Assesses the ease with which an alternative may be implemented, including technical and administrative feasibility (e.g., technical aspects of implementation and regulatory approval), and availability of required materials and services.

- Cost

  - Calculates capital, operation and maintenance (O&M), and net present worth costs for each alternative.

- State acceptance

  - Indicates whether – based on review of the RI/FS, Proposed Plan, and public comments – the State accepts the recommended alternative.

- Community acceptance

  - Indicates the extent to which – based on review of the RI/FS and Proposed Plan – the public accepts the recommended alternative. Comments from the public are included in the Responsiveness Summary (Section 3).

Each evaluation criterion is ranked high, moderate, or low for each remedial alternative considered. The alternative with the highest overall ranking is recommended for the SWMU.

2.11.1 Remedy Components

For each SWMU, the alternative that best protects human health and the environment, has proven reliable at other sites, and meets regulations is recommended to the public and UDEQ. The recommended alternatives for the SWMUs within OU 8 are listed below:

- **Institutional controls** – SWMU 13, 22, and 36
  - Land use restrictions to prevent residential use and off-site transportation of soils.
  - 5-year site reviews to monitor changes in SWMU conditions and remedy effectiveness.
- **Excavation and solidification/stabilization** – SWMUs 6 and 8
  - Removal of lead-contaminated soil and treatment onsite through solidification/ stabilization.
  - Placing treated soil in the excavation and covering with clean soil.
  - Removal of 2,4-DNT-contaminated soil (SWMU 6) and off-post treatment and disposal.
  - Land use controls to prevent future residential use and off-site transportation of soils from the SWMU.
  - 5-year site reviews to monitor changes in SWMU conditions.

2.11.2 SWMU Summaries – Comparative Analysis of Alternatives

Sections 2.11.2.1 through 2.11.2.5 summarize the comparative analysis of alternatives for each of the SWMUs. The relative performance of the alternatives is compared with respect to the nine evaluation criteria to effectively assess the advantages and disadvantages of each. Table 2-1 summarizes the recommended alternatives for the SWMUs in OU 8. The recommended alternative is presented in bold type.

2.11.2.1 SWMU 6. Based on results of the human health and ecological RAs, no action (Alternative 1), institutional controls (Alternative 2), soil cover (Alternative 3), excavation and off-post treatment/disposal (Alternative 4), excavation, soil washing, and off-post treatment/disposal (Alternative 5), and excavation and solidification/stabilization (Alternative 6) are identified as remedial alternatives for SWMU 6. To be conservative, UXO clearance is included for all intrusive actions; although no UXO were found, UXO personnel were onsite during RI sampling activities for safety purposes.

- Overall protection of human health and the environment

  – No action (Alternative 1) does not achieve overall protection of human health and the environment because it does not prevent potential future residential use of SWMU 6 or intrusive soil activities.

  – Institutional controls (Alternative 2) provide moderate compliance with overall protection of human health and the environment. Institutional controls will only partially be protective of human health and the environment because land use controls prevent residential use of SWMU 6 and intrusive soil activities, however, they do not fully protect depot or construction workers from exposure.

  – A soil cover (Alternative 3) reduces the risk to workers by preventing contact with contaminated soil at the site and by applying land use controls to prevent future residential use and intrusive soil activities.

  – Excavation and off-post treatment/disposal (Alternative 4) reduce the risks to hypothetical future residents or construction workers by removing contaminated soil and by applying land use controls to prevent future residential use and intrusive soil activities.

  – Excavation, soil washing, and off-post treatment/disposal (Alternative 5) reduce the risks to hypothetical future residents or construction workers by removing and washing the soil contaminated with lead at levels above FRGs, removing the soil contaminated with 2,4-DNT at levels above FRGs, and applying land use controls to prevent future residential use and intrusive soil activities.

  – Excavation and solidification/stabilization (Alternative 6) reduce the risks to hypothetical future residents or construction workers associated with lead and 2,4-DNT in soil. This alternative includes land use controls to prevent future residential use and intrusive soil activities.

  – Alternatives 2, 3, 4, 5, and 6 all meet the specified RAOs and provide for overall protection of human health.

- Compliance with ARARs

  – No action (Alternative 1) does not comply with ARARs including the Risk Rule because of the risks posed to hypothetical future residents or construction workers. The remaining alternatives comply with ARARs at SWMU 6.

TABLE 2-1

Summary of Comparative Analysis of Remedial Alternatives
OU 8

SWMU/ Remedial Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume	Short-term Effectiveness	Implementability	Present Worth Cost
OU 8							
SWMU 6, Old Burn Area							
- No action	Does not prevent potential future exposure	Does not comply with UAC R315-101	Is not effective over the long term	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$0
- Institutional controls	No reduction in potential lead exposure to construction worker	Does not comply with UAC R315-101	No reduction in potential lead exposure to construction worker	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$64,600
- Soil cover	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces mobility with soil cover	Installation in accordance with OSHA (b)	Easily implemented	$114,300
- Excavation and off-post treatment/disposal	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces toxicity, mobility, and volume, with treatment occurring prior to disposal in a secure landfill	Excavation and trans-portation in accord-ance with OSHA	Easily implemented	$2,431,200
- Excavation and soil washing	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces volume of COCs in soil; pretreatment optimization study recommended	Excavation, treat-ment, and transporta-tion in accordance with OSHA	Fairly easy to implement; treatability study recommended	$2,748,900
- **Excavation and solidifi-cation/stabilization** (a)	Is protective of human health and the environment	Complies with all ARARs and R315-13	May be residual risk from treated soil	Reduces mobility of contaminants in soil; pre-treatment optimization study recommended	Excavation and treat-ment in accordance with OSHA	Fairly easy to implement	$1,106,300
SWMU 8, Small Arms Firing Range							
- No action	Does not prevent potential future exposure	Does not comply with UAC R315-101	Is not effective over the long term	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$0
- Institutional controls	No reduction in potential	May not comply	No reduction in potential	Does not reduce toxicity,	No negative short-		$37,400

TABLE 2-1 (cont'd)

SWMU/ Remedial Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume	Short-term Effectiveness	Implementability	Present Worth Cost
	lead exposure to construction worker or the environment	with all ARARs	lead exposure to construction worker	mobility, or volume through treatment	term health or safety problems	Easily implemented	
- Soil cover	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces mobility with soil cover	Installation in accordance with OSHA	Easily implemented	$65,300
- Excavation and off-post treatment/disposal	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces toxicity, mobility, and volume, with treatment occurring prior to disposal in a secure landfill	Excavation and trans-portation in accord-ance with OSHA	Easily implemented	$2,004,300
- Excavation and soil washing	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces volume of COCs in soil; pretreatment optimization study recommended	Excavation, treatment, and transportation in accordance with OSHA	Fairly easy to implement, treatability study recommended	$2,094,400
- **Excavation and solidifi-cation/stabilization** (a)	Is protective of human health and the environment	Complies with all ARARs	Is effective over the long term	Reduces mobility of contaminants in soil; pre-treatment optimization study recommended	Excavation and treat-ment in accordance with OSHA	Fairly easy to implement	$833,400
SWMU 13, Tire Disposal Area							
- No action	Is protective of human health and the environment	Does not comply with UAC R315-101	Is effective over the long term	None	No negative short-term health or safety problems	Easily implemented	$0
- **Institutional controls** (a)	Is protective of human health and the environment	Complies with all ARARs	Restrictions on future use are effective and permanent	Eliminates residential exposure	No negative short-term health or safety problems	Easily implemented	$37,400

TABLE 2-1 (cont'd)

SWMU/ Remedial Alternative	Overall Protection of Human Health and the Environment	Compliance with ARARs	Long-term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume	Short-term Effectiveness	Implementability	Present Worth Cost
SWMU 22, Building 1303 Washout Pond							
- No action	Is protective of human health and the environment	Does not comply with UAC R315-101	Is effective over the long term	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$0
- **Institutional controls** (a)	Is protective of human health and the environment	Complies with all ARARs	Restrictions on future use are effective and permanent	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$37,400
SWMU 36, Old Burn Staging Area							
- No action	Is protective of human health and the environment	Does not comply with UAC R315-101	Is not effective over the long term	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$0
- **Institutional controls** (a)	Is protective of human health and the environment	Complies with all ARARs	Restrictions on future use are effective and permanent	Does not reduce toxicity, mobility, or volume through treatment	No negative short-term health or safety problems	Easily implemented	$37,400

(a) Recommended alternative.
(b) Occupational Safety and Health Administration.

- Long-term effectiveness and permanence

  – No action (Alternative 1) offers no measures to reduce the risks associated with potential future residential exposure to soil at SWMU 6.

  – Institutional controls (Alternative 2) in the form of land use controls provide for long-term and permanent prevention of future residential use. However, under Alternatives 1 and 2, the residual risk from soil with lead or 2,4-DNT contamination at levels above FRGs remains onsite.

  – Alternative 3 provides moderate long-term effectiveness in reducing risks associated with lead and 2,4-DNT, and preventing future residential use. The effectiveness of this alternative is dependent on TEAD's ability to enforce restrictions limiting onsite construction activities in the revetment area and to maintain the integrity of the soil cover.

  – Alternatives 4, 5, and 6 are effective over the long term. The residual risk remaining onsite results from soil containing lead or 2,4-DNT at concentrations at or below FRGs. Land use controls prevent the completion of exposure pathways and further reduce risk. In addition, 5-year site reviews monitor changes in SWMU conditions

- Reduction of toxicity, mobility, or volume through treatment

  – Neither no action nor institutional controls (Alternatives 1 and 2) reduce the toxicity, mobility, or volume of contaminants through treatment.

  – A soil cover (Alternative 3) reduces the mobility of contaminants by reducing surface water infiltration and limiting the transport of contaminants via wind and surface water erosion.

  – Excavation and off-post treatment/disposal (Alternative 4) reduce the mobility of contaminants by disposing of the soil in a secure landfill.

  – Excavation, soil washing, and off-post treatment/disposal (Alternative 5) reduce the volume of lead and 2,4-DNT in soil by concentrating the lead via soil washing, and either treating or disposing of it and the 2,4-DNT-contaminated soil in a secure landfill.

  – Excavation and solidification/stabilization (Alternative 6) reduce the mobility of contaminants in soil by immobilizing them in a solid matrix.

- Short-term effectiveness

  – No action and institutional controls (Alternatives 1 and 2) have no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 6.

  – Limited short-term risks to the onsite worker and the surrounding community are anticipated during excavation and transportation of the contaminated soil (Alternatives 3, 4, 5, and 6). These potential effects are minimized by control measures (e.g., dust suppression, use of personal protective equipment).

- Implementability

  – No action (Alternative 1) is technically feasible because it includes no construction or operation components. Institutional controls (Alternative 2) are also technically feasible. However, because residual risk remains onsite, Alternatives 1 and 2 do not comply with the Risk Rule.

  – Alternatives 3, 4, 5, and 6 present no technical or administrative difficulties. A treatability study is required for soil washing and solidification/stabilization (Alternatives 5 and 6) to select the optimum reagents and processing techniques for the soil and contaminants at SWMU 6. The materials required for implementation of all alternatives are readily available.

- Cost

  – *Alternative 1 – No action*
  Present worth cost is $0.

  – *Alternative 2 – Institutional controls*
  Present worth cost is $64,600.

  – *Alternative 3 – Soil cover*
  Present worth cost is $114,300.

  – *Alternative 4 – Excavation and off-post treatment/disposal*
  Present worth cost is $2,431,200.

  – *Alternative 5 – Excavation, soil washing, and off-post treatment/disposal*
  Present worth cost is $2,748,900.

  – *Alternative 6 – Excavation and solidification/stabilization*
  Present worth cost is $1,106,300.

TABLE 2-2

Relative Ranking of Remedial Alternatives
Old Burn Area (SWMU 6) (a)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 Soil Cover	Alternative 4 Excavation and Off-Post Treatment/ Disposal	Alternative 5 Excavation, Soil Washing and Off-Post Treatment/ Disposal	Alternative 6 Excavation and Solidification/ Stabilization
Overall protection of human health and the environment	○	◒	●	●	●	●
Compliance with ARARs	○	●	●	●	●	●
Long-term effectiveness and permanence	○	◒	◒	●	●	◒
Reduction of toxicity, mobility, and volume through treatment	No treatment	No treatment	○	◒	●	◒
Short-term effectiveness	●	●	◒	◒	◒	◒
Implementability	◒	●	◒	●	◒	◒
Cost	$0	$64,600	$114,300	$2,431,200	$2,748,900	$1,106,300

(a) Rankings of high, moderate, or low indicate how well each alternative meets each evaluation criterion when compared.

High ● Moderate ◒ Low ○

- State acceptance; community acceptance

  – These criteria are evaluated after State and public review of the recommended alternatives.

Based on the relative ranking of alternatives in Table 2-2, Alternative 6 (excavation and solidification/stabilization) is recommended for SWMU 6. Alternative 5 and Alternative 6 are closely ranked, however, the difference in cost makes Alternative 6 the most suitable for SWMU 6.

2.11.2.2 SWMU 8. Based on results of the human health and ecological RAs, no action (Alternative 1), institutional controls (Alternative 2), soil cover (Alternative 3), excavation and off-post treatment/disposal (Alternative 4), excavation, soil washing, and off-post treatment/disposal (Alternative 5), and excavation and solidification/stabilization (Alternative 6) are identified as remedial alternatives for SWMU 8.

- Overall protection of human health and the environment

  – No action (Alternative 1) does not achieve overall protection of human health and the environment because it does not prevent potential future residential use of SWMU 8 or reduce current ecological risks.

  – Institutional controls (Alternative 2) do not prevent exposure of a potential future construction worker to lead contamination or reduce current ecological risks.

  – A soil cover (Alternative 3); excavation and off-post treatment/disposal (Alternative 4); excavation, soil washing, and off-post treatment/disposal (Alternative 5); and excavation and solidification/stabilization (Alternative 6) all provide overall protection of human health and the environment by preventing contact with lead-contaminated soil, removing contamination from the site, or treating the contaminated soil.

- Compliance with ARARs

  – Neither no action nor institutional controls (Alternatives 1 and 2) comply with ARARs or the Risk Rule because of the risks to hypothetical future residents and the environment. Alternatives 3, 4, 5, and 6 meet the Risk Rule and other ARARs at SWMU 8.

- Long-term effectiveness and permanence

  – No action (Alternative 1) offers no measures to reduce the risk associated with potential future residential exposure to soil at SWMU 8.

- Institutional controls (Alternative 2) provide for long-term and permanent prevention of future residential use because of land use controls. However, the residual risk from soil with lead remains onsite.

- Alternative 3 provides moderate long-term effectiveness in reducing risks associated with lead and preventing future residential use. The effectiveness of this alternative is dependent on TEAD's ability to maintain the integrity of the soil cover.

- Alternatives 4, 5, and 6 are effective over the long term. The residual risk remaining onsite results from soil containing lead at concentrations at or below the FRGs. Land use controls prevent the completion of exposure pathways and further reduce risk. In addition, 5-year site reviews monitor changes in SWMU conditions.

- Reduction of toxicity, mobility, or volume through treatment

  - Neither no action nor institutional controls (Alternatives 1 and 2) reduce the toxicity, mobility, or volume of contaminants through treatment.

  - A soil cover (Alternative 3) reduces the mobility of contaminants by reducing surface water infiltration and limiting the transport of contaminants via wind and surface water runoff.

  - Excavation and off-post treatment/disposal (Alternative 4) reduce the mobility of contaminants by disposing of the soil in a secure landfill.

  - Excavation, soil washing, and off-post treatment/disposal (Alternative 5) reduce the volume of lead in soil by concentrating the lead via soil washing and either treating or disposing of it in a secure landfill.

  - Excavation and solidification/stabilization (Alternative 6) reduce the mobility of contaminants in soil by immobilizing them in a solid matrix.

- Short-term effectiveness

  - No action, institutional controls, and a soil cover (Alternatives 1, 2, and 3) have no adverse effects on the community or onsite workers. No unacceptable risks or hazards were identified for Depot workers at SWMU 8.

  - Limited short-term risks to the onsite worker and the surrounding community are anticipated during excavation and transportation of the contaminated soil (Alternatives 4, 5, and 6). These potential effects are minimized by control measures (e.g., dust suppression, use of personal protective equipment).

- Implementability

  – No action and institutional controls (Alternatives 1 and 2) are technically feasible because they include no construction or operation components. However, because residual risk remains onsite, they do not comply with the Risk Rule.

  – Alternatives 3, 4, 5, and 6 achieve remediation goals and are technically and administratively feasible. A treatability study is required for soil washing and solidification/stabilization (Alternatives 5 and 6) to select the optimum reagents and processing techniques for the lead-contaminated soil at SWMU 8. The materials required for implementation of all alternatives are readily available.

- Cost

  – *Alternative 1 – No action*
  Present worth cost is $0.

  – *Alternative 2 – Institutional controls*
  Present worth cost is $37,400.

  – *Alternative 3 – Soil cover*
  Present worth cost is $65,300.

  – *Alternative 4 – Excavation and off-post treatment/disposal*
  Present worth cost is $2,004,300.

  – *Alternative 5 – Excavation, soil washing, and off-post treatment/disposal*
  Present worth cost is $2,094,400.

  – *Alternative 6 – Excavation and solidification/stabilization.*
  Present worth cost is $833,400.

- State acceptance; community acceptance

  – These criteria are evaluated after State and public review of the recommended alternatives.

Based on the relative ranking of alternatives in Table 2-3, Alternative 6 (excavation and solidification/stabilization) is recommended for SWMU 8. Alternative 5 and Alternative 6 are closely ranked, however, the difference in cost makes Alternative 6 the most suitable for SWMU 8.

TABLE 2-3

Relative Ranking of Remedial Alternatives
Small Arms Firing Range (SWMU 8) (a)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls	Alternative 3 Soil Cover	Alternative 4 Excavation and Off-Post Treatment/ Disposal	Alternative 5 Excavation, Soil Washing, and Off-Post Treatment/ Disposal	Alternative 6 Excavation and Solidification/ Stabilization
Overall protection of human health and the environment	○	◒	●	●	●	●
Compliance with ARARs	○	●	●	●	●	●
Long-term effectiveness and permanence	○	◒	◒	●	●	◒
Reduction of toxicity, mobility, and volume through treatment	No treatment	No treatment	○	◒	●	◒
Short-term effectiveness	●	●	◒	◒	◒	◒
Implementability	◒	●	◒	●	◒	◒
Cost	$0	$37,400	$65,300	$2,004,300	$2,094,400	$833,400

(a) Rankings of high, moderate, or low indicate how well each alternative meets each evaluation criterion when compared.

High ● Moderate ◒ Low ○

2.11.2.3 SWMU 13. Based on results of the human health and ecological RAs, no action (Alternative 1) and institutional controls (Alternative 2) are identified as remedial alternatives for SWMU 13.

- Overall protection of human health and the environment

  – Under the reasonably anticipated future land use scenario (i.e., industrial), there are no unacceptable risks or hazards at this SWMU. However, because this alternative does not prevent potential future residential use of SWMU 13, it provides no additional protection of human health and may allow unacceptable exposure to potential residents through the consumption of fruits and tubers. Therefore, the no action alternative (Alternative 1) is not considered to be protective of human health and the environment.

  – Institutional controls (Alternative 2) provide overall protection of human health because land use controls prevent residential use.

  – Under either alternative, no contaminated soil is removed or treated, and site is considered to have a residual risk.

- Compliance with ARARs

  – No action (Alternative 1) does not comply with ARARs including the Risk Rule because of the possible risk posed by residential consumption of homegrown produce. Because the successful cultivation of produce onsite is very unlikely, the risk related to this ingestion pathway is considered to be overestimated by model results.

  – Institutional controls (Alternative 2) comply with the Risk Rule and other ARARs at SWMU 13.

- Long-term effectiveness and permanence

  – No action (Alternative 1) offers no measures to prevent future residential land use at SWMU 13. Because of the residential risk associated with this site through the produce ingestion pathway, Alternative 1 is not considered to provide long-term effectiveness and permanence.

  – The land use controls under institutional controls (Alternative 2) are likely to provide long-term and permanent prevention of future residential use. In addition, 5-year site reviews monitor changes in SWMU conditions.

- Reduction of toxicity, mobility, or volume through treatment

  – Neither no action nor institutional controls (Alternatives 1 and 2) reduce the toxicity, mobility, or volume of contaminants through treatment.

- Short-term effectiveness

  – No action and institutional controls (Alternatives 1 and 2) have no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 13.

- Implementability

  – The no action alternative (Alternative 1) is technically feasible because it has no construction or operation components. However, because residual risk remains onsite, Alternative 1 does not comply with the Risk Rule.

  – Institutional controls (Alternative 2) are technically and administratively feasible. Although residual risk remains onsite, land use controls meet administrative requirements of the Risk Rule.

- Cost

  – *Alternative 1 – No action*
  Present worth cost is $0.

  – *Alternative 2 – Institutional controls*
  Present worth cost is $37,400.

- State acceptance; community acceptance

  – These criteria are evaluated after State and public review of the recommended alternatives.

Based on the relative ranking of alternatives in Table 2-4, Alternative 2 (institutional controls) is recommended for SWMU 13.

TABLE 2-4

Relative Ranking of Remedial Alternatives
Tire Disposal Area (SWMU 13) (a)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls
Overall protection of human health and the environment	◓	●
Compliance with ARARs	○	●
Long-term effectiveness and permanence	●	●
Reduction of toxicity, mobility, and volume through treatment	No treatment	No treatment
Short-term effectiveness	●	●
Implementability	◓	●
Cost	$0	$37,400

(a) Rankings of high, moderate, or low indicate how well each alternative meets each evaluation criterion when compared.

High ● Moderate ◓ Low ○

2.11.2.4 SWMU 22. Based on results of the revised human health and ecological RAs, no action (Alternative 1) and institutional controls (Alternative 2) are identified as remedial alternatives for SWMU 22:

- Overall protection of human health and the environment

  – Under the reasonably anticipated future land use scenario (i.e., industrial), there are no unacceptable risks or hazards at this SWMU. However, because this alternative does not prevent potential future residential use of SWMU 22, it provides no additional protection of human health over current conditions and may allow potential residential risks from the consumption of produce grown onsite. Therefore, the no action alternative (Alternative 1) is not considered to be protective of human health and the environment.

  – Institutional controls (Alternative 2) provide overall protection of human health because land use controls prevent residential use.

  – Under either alternative, no contaminated soil is removed or treated, and the site is considered to have a residual risk.

- Under either alternative, no contaminated soil is removed or treated, and the site is considered to have a residual risk.

- Compliance with ARARs

  - No action (Alternative 1) does not comply with ARARs including the Risk Rule because of the possible risk posed by residential consumption of homegrown produce. Because the successful cultivation of produce onsite is very unlikely, the risk related to this ingestion pathway is considered to be overestimated by model results.

  - Institutional controls (Alternative 2) comply with the Risk Rule and comply with other ARARs at SWMU 22.

- Long-term effectiveness and permanence

  - No action (Alternative 1) offers no measures to prevent future residential land use at SWMU 22. Because of the risk associated with this site through the produce ingestion pathway, Alternative 1 is not considered to provide long-term effectiveness and permanence.

  - The land use controls under institutional controls (Alternative 2) provide long-term and permanent prevention of future residential use. In addition, 5-year site reviews monitor changes in SWMU conditions.

- Reduction of toxicity, mobility, or volume through treatment

  - Neither no action nor institutional controls (Alternatives 1 and 2) reduce the toxicity, mobility, or volume of contaminants through treatment.

- Short-term effectiveness

  - No action and institutional controls (Alternatives 1 and 2) have no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 22.

- Implementability

  - The no action alternative (Alternative 1) is technically feasible because it has no construction or operation components. However, because residual risk remains onsite, Alternative 1 does not comply with the Risk Rule.

– *Alternative 1 – No action*
Present worth cost is $0.

– *Alternative 2 – Institutional controls*
Present worth cost is $37,400.

- State acceptance; community acceptance

– These criteria are evaluated after State and public review of the recommended alternatives.

Based on the relative ranking of alternatives in Table 2-5, Alternative 2 (institutional controls) is recommended for SWMU 22.

TABLE 2-5

Relative Ranking of Remedial Alternatives
Building 1303 Washout Pond (SWMU 22) (a)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls
Overall protection of human health and the environment	◓	●
Compliance with ARARs	○	●
Long-term effectiveness and permanence	●	●
Reduction of toxicity, mobility, and volume through treatment	No treatment	No treatment
Short-term effectiveness	●	●
Implementability	●	●
Cost	$0	$37,400

(a) Rankings of high, moderate, or low indicate how well each alternative meets each evaluation criterion when compared.

High ● Moderate ◓ Low ○

2.11.2.5 SWMU 36. Based on results of the human health and ecological RAs, no action (Alternative 1) and institutional controls (Alternative 2) are identified as remedial alternatives for SWMU 36.

- Overall protection of human health and the environment

2.11.2.5 SWMU 36. Based on results of the human health and ecological RAs, no action (Alternative 1) and institutional controls (Alternative 2) are identified as remedial alternatives for SWMU 36.

- Overall protection of human health and the environment
  - Under the reasonably anticipated future land use scenario (i.e., industrial), there are no unacceptable cancer risks or hazards at this SWMU. However, because this alternative does not prevent potential future residential use of SWMU 36, it provides no additional protection of human health and the environment over current conditions and allows residual risk to remain onsite. Therefore, the no action alternative (Alternative 1) is not considered to be protective of human health and the environment.
  - Institutional controls (Alternative 2) provide overall protection of human health because land use controls prevent residential use.
  - Under either alternative, no contaminated soil is removed or treated, and the site is considered to have a residual risk.
- Compliance with ARARs
  - No action (Alternative 1) does not comply with ARARs including the Risk Rule.
  - Institutional controls (Alternative 2) comply with the Risk Rule and comply with other ARARs at SWMU 36.
- Long-term effectiveness and permanence
  - No action (Alternative 1) offers no measures to prevent future residential land use at SWMU 36.
  - The land use controls under institutional controls (Alternative 2) provide long-term effectiveness and permanent prevention of residential use. In addition, 5-year site reviews monitor changes in SWMU conditions.
  - Under either alternative, no contaminated soil is removed or treated, and the site is considered to have a residual risk.

- Reduction of toxicity, mobility, or volume through treatment

  – Neither no action nor institutional controls (Alternatives 1 and 2) reduce the toxicity, mobility, or volume of contaminants through treatment.

- Short-term effectiveness

  – No action and institutional controls (Alternatives 1 and 2) have no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 36.

- Implementability

  – No action (Alternative 1) is technically feasible because it has no construction or operation components. However, because residual risk remains onsite, Alternative 1 does not comply with the Risk Rule. Institutional controls (Alternative 2) are technically and administratively feasible. Although residual risk remains onsite, land use controls meet administrative requirements of the Risk Rule.

- Cost

  – *Alternative 1 – No action*
  Present worth cost is $0.

  – *Alternative 2 – Institutional controls*
  Present worth cost is $37,400.

- State acceptance; community acceptance

  – These criteria are evaluated after State and public review of the recommended alternatives.

Based on the relative ranking of alternatives in Table 2-6, Alternative 2 (institutional controls) is recommended for SWMU 36.

TABLE 2-6

Relative Ranking of Remedial Alternatives
Old Burn Staging Area (SWMU 36)

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Institutional Controls
Overall protection of human health and the environment	◓	●
Compliance with ARARs	○	●
Long-term effectiveness and permanence	○	●
Reduction of toxicity, mobility, and volume through treatment	No treatment	No treatment
Short-term effectiveness	●	●
Implementability	◓	●
Cost	$0	$37,400

(a) Rankings of high, moderate, or low indicate how well each alternative meets each evaluation criterion when compared.

High ● Moderate ◓ Low ○

2.12 SELECTED REMEDY

2.12.1 SWMU 6 – Excavation and Solidification/Stabilization

Excavation and solidification/stabilization (Alternative 6) is the recommended alternative at the Old Burn Area (SWMU 6). It reduces the construction worker risks associated with lead by excavation and solidification/stabilization of the soil contaminated at levels above FRGs, places treated soil in the designated CAMU, and returns the site to original conditions. Confirmation samples are collected from the excavated area to verify that the contaminated soil has been removed. The 2,4-DNT-contaminated soil will be excavated and treated and disposed off site at a Subtitle C landfill or TSDF, as appropriate. UXO clearance is included for excavation activities. This alternative also includes institutional controls. The OU 8 institutional controls include land use controls (LUCs) that will be implemented and maintained by the Army.

Objectives of the OU 8 LUCs are to – 1) Prevent residential use of the SWMU and 2) Prevent off-site transportation of soil from the SWMU. The OU 8 RD Plan for Institutional Controls summarizes the land use controls objectives and mechanisms that will be used to minimize future violations of land use controls at OU 8. The land use

controls shall be maintained on all land within the boundaries of SWMUs as shown in Appendix A of the OU 8 RD Plan.

The Army shall implement, maintain, monitor, report on and enforce the land use controls according to the OU 8 RD Plan. Land Use Controls shall be maintained until the concentrations of hazardous substances in the SWMUs have been reduced to levels that allow for unlimited exposure and unrestricted use. If the Army, EPA, and UDEQ conclude that a SWMU is subsequently remediated to unrestricted use, LUCs will be removed by revising the OU 8 RD Plan and relevant mechanisms.

Alternative 6 meets the RAOs and is protective of human health and the environment. It meets all ARARs, particularly those provided in the Risk Rule; and also complies with State land disposal restrictions, and CAMU regulations.

The combination of solidification/stabilization, off site treatment and disposal, a soil cover, and land use controls provides a long-term and permanent reduction in the risks associated with SWMU 6. Although 5-year site reviews monitor the long-term effectiveness and permanence of this alternative, some long-term liability is associated with the placement of solidified/stabilized soil in the CAMU. The residual risk results from soil with lead or 2,4-DNT at concentrations at or below FRGs. Land use controls prevent the completion of exposure pathways and further reduce risk.

The solidification/stabilization of lead-contaminated soil reduces the mobility of lead, and is likely to reduce their bioavailability – and, therefore, their toxicity. However, Alternative 6 does not reduce the volume of contaminated soil. Solidification/ stabilization produces a product that is 20 to 30 percent greater in volume.

Short-term risks to the community, onsite workers, or the environment are expected to be moderate. Onsite workers may be exposed to debris during removal actions, and to contaminated soil during excavation and solidification/ stabilization. However, Alternative 6 includes appropriate precautionary measures, as necessary (e.g., dust suppression, use of personal protective equipment).

The total volume of lead and 2,4-DNT contamination is likely biased high because the contamination could potentially be localized around each of the sample locations with a FRG exceedance. Lead was detected in one surface soil and three subsurface soil samples at two locations at levels above the FRG; 2,4-DNT was detected in two surface soil samples at two locations at levels above the FRG.

Figure 2-8 shows the approximate area of contamination. The horizontal extent of potential lead soil contamination is estimated by assuming that contamination is limited by the berm located along the western edge of the northeast revetment area. This area is approximately 5,940 ft^2; assuming a depth of 10 feet provides an estimated total volume of 2,200 yd^3 of lead-contaminated soil at SWMU 6. The estimated area of potential 2,4-DNT soil contamination is 3,250 ft^2 at a depth of 1 foot – for an estimated total volume of 120 yd^3 of soil. A 20 percent contingency is added to the excavated

volume of soil in Table 2-12 to protect against unforeseen increases in excavation volumes.

Table 2-7 presents the estimated cost for this alternative.

2.12.2 SWMU 8 – Excavation and Solidification/Stabilization

Excavation and solidification/stabilization (Alternative 6) is the recommended alternative at the Small Arms Firing Range (SWMU 8). It reduces the risks to hypothetical future residents and ecological receptors due to soil contaminated with lead at levels above FRGs. This alternative includes excavation and solidification/ stabilization of the contaminated soil, placement of treated soil in the designated CAMU, and returns the site to original conditions. Confirmation samples are collected from the excavated area to verify that the contaminated soil has been removed. This alternative also includes institutional controls. See Paragraph 2.12.1 for additional information regarding Institutional Controls.

Alternative 6 meets RAOs, is protective of human health and the environment, and will comply with all ARARs.

The combination of solidification/stabilization, a soil cover, and land use controls provides a long-term and permanent reduction in the risks associated with SWMU 8. Although 5-year site reviews monitor the long-term effectiveness and permanence of this alternative, some long-term liability is associated with the placement of solidified/stabilized soil to the CAMU. The residual risk results from soil with lead at concentrations at or below FRGs. Land use controls prevent the completion of exposure pathways and further reduce risk.

The solidification/stabilization of lead-contaminated soil reduces the mobility of lead, and is likely to reduce its bioavailability and toxicity. However, Alternative 6 does not reduce the volume of contaminated soil. Solidification/stabilization produces a product that is 20 to 30 percent greater in volume.

Short-term risks to the community, onsite workers, or the environment are expected to be moderate. Onsite workers may be exposed to contaminated soil during excavation and solidification/stabilization. However, Alternative 6 includes appropriate precautionary measures, as necessary (e.g., dust suppression, use of personal protective equipment).

Lead in soil is the COC identified for SWMU 8. Lead was detected at levels above the FRG in numerous samples from the bullet stops area. The area of lead contamination is located on the front and back berms. Figure 2-13 shows the approximate area of contamination. The front berm is estimated to be 8 feet in height, and the entire area is to be excavated. There is also a small area of contamination in front of this berm that is estimated to require excavation to a depth of 1 foot. At the back berm, where lead contamination levels are elevated, the area is to be excavated to a depth

Table 2-7
SWMU 6 - Alternative 6: *Excavation and Solidification/Stabilization* Cost Estimate

Activity	Quantity	Unit	Unit Cost	Total Cost
Direct Capital Costs				
Land Use Controls	1	ea	$ 5,000.00	$ 5,000
UXO Clearance and Disposal	1,175	sy	$ 10.00	$ 11,800
Ground Preparation/Clearing	1,175	sy	$ 0.20	$ 1,300
Soil Excavation (2,4-DNT)	145	cy	$ 20.00	$ 2,900
Soil Excavation & Hauling to CAMU	2,640	cy	$ 20.00	$ 52,800
Placement of Clean Fill	2,785	cy	$ 10.00	$ 27,900
Soil Cover at CAMU	1,000	cy	$ 10.00	$ 10,000
Confirmation Sampling	279	sample	$ 115.00	$ 32,100
Mobilization/Demobilization	1	ls	$ 50,000.00	$ 50,000
Treatment Pad and Stockpile Area	1	ls	$ 20,000.00	$ 20,000
Solidification/Stabilization Pre-optimization Study	1	ls	$ 10,000.00	$ 10,000
Solidification/Stabilization	3,700	ton	$ 75.00	$ 277,500
Soil Profile & Analytical Costs	28	sample	$ 1,300.00	$ 36,400
Debris Screening	1	ls	$ 60,400.00	$ 60,400
Transport/Disposal (2,4 - DNT) Subtitle C	145	cy	$ 244.00	$ 35,400
Transport/Disposal Screen Debris Subtitle D	5	cy	$ 55.00	$ 300
Grading	11	msf	$ 48.00	$ 1,600
Revegetation/Seeding	1,175	sy	$ 0.22	$ 1,300
Subtotal Direct Capital Costs				$ 636,700
Indirect Capital Costs				
Engineering and Construction Management (20% of direct costs less land use restrictions)				$ 126,400
Health and Safety Equipment & Training (5% of direct costs less land use restrictions)				$ 31,600
Legal and Administrative (5% of direct costs less land use restrictions)				$ 31,600
Project Management (10% of direct costs less land use restrictions)				$ 63,200
Subtotal Indirect Capital Costs				$ 252,800
Total Capital Costs				$ 889,500
Annual O&M Direct Costs				
Subtotal Annual O&M Direct Costs				
Other O&M Direct Costs				
Five-Year Site Review	1	ea	$15,000.00	$ 15,000
Subtotal Other O&M Direct Costs				$ 15,000
Present Worth O&M Direct Costs (30 yrs @ 7% discount rate)				$ 32,400
Total Present Worth O&M Costs (30 yrs @ 7% discount rate)				$ 32,400
Subtotal Cost Of Alternative				**$ 921,900**
Contingency (@ 20%)				$ 184,400
Total Cost Of Alternative				**$ 1,106,300**

Key to unit abbreviations

cy	cubic yard
ls	lump sum
msf	thousand square feet
sample	per sample
sy	square yard
ton	per US ton
ea	*each*

of 3 feet. The area of potential lead contamination is approximately 7,500 ft^2 at varying depths due to the slopes of the berms. The estimated total volume of lead-contaminated soil at SWMU 8 is 2,002 yd^3. A 20 percent contingency is added to the excavated volume of soil in Table 2-13 to protect against unforeseen increases in excavation volumes.

Table 2-8 presents the estimated cost for this alternative.

2.12.3 SWMU 13 – Institutional Controls

Institutional controls (Alternative 2) is the recommended alternative at the Tire Disposal Area (SWMU 13). See Paragraph 2.12.1 for additional information regarding Institutional Controls.

Alternative 2 provides long-term effectiveness and permanence. In addition, it has no adverse effects on the community, Depot workers, or the environment.

Table 2-9 presents the estimated costs for this alternative.

2.12.4 SWMU 22 – Institutional Controls

Institutional controls (Alternative 2) is the recommended alternative at the Building 1303 Washout Pond (SWMU 22). See Paragraph 2.12.1 for additional information regarding Institutional Controls.

Alternative 2 provides long-term effectiveness and permanence. In addition, it has no adverse effects on the community, Depot workers, or the environment.

Table 2-10 presents the estimated costs for this alternative.

2.12.5 SWMU 36 – Institutional Controls

Institutional controls (Alternative 2) is the recommended alternative at the Old Burn Staging Area (SWMU 36). See Paragraph 2.12.1 for additional information regarding Institutional Controls.

Alternative 2 is protective of human health and the environment, and provides for long-term effectiveness and permanence by preventing future residential use of the Old Burn Staging Area.

Table 2-11 presents the estimated cost for this alternative.

Table 2-8
SWMU 8 - Alternative 6: *Excavation and Solidification/Stabilization* Cost Estimate

Activity	Quantity	Unit	Unit Cost	Total Cost
Direct Capital Costs				
Land Use Controls	1	ea	$5,000.00	$ 5,000
Ground Preparation/Clearing	958	sy	$ 0.20	$ 1,200
Soil Excavation & Hauling to CAMU	2,403	cy	$ 25.00	$ 61,100
Soil Cover at CAMU	1,000	cy	$ 10.00	$ 10,000
Confirmation Sampling	241	sample	$ 115.00	$ 27,800
Mobilization/Demobilization	1	ls	$ 50,000.00	$ 50,000
Treatment Pad and Stockpile Area	1	ls	$ 20,000.00	$ 20,000
Solidification/Stabilization Pre-optimization Study	1	ls	$ 10,000.00	$ 10,000
Solidification/Stabilization	3,364	ton	$ 75.00	$ 252,400
Soil Profile & Analytical Costs	25	sample	$ 1,300.00	$ 32,500
Grading	9	msf	$ 48.00	$ 1,500
Revegetation/Seeding	958	sy	$ 0.22	$ 1,300
Subtotal Direct Capital Costs				$ 472,800
Indirect Capital Costs				
Engineering and Construction Management (20% of direct costs)				$ 94,600
Health and Safety Equipment & Training (5% of direct costs)				$ 23,700
Legal and Administrative (5% of direct costs)				$ 23,700
Project Management (10% of direct costs)				$ 47,300
Subtotal Indirect Capital Costs				$ 189,300
Total Capital Costs				$ 662,100
Annual O&M Direct Costs				
Subtotal Annual O&M Direct Costs				
Other O&M Direct Costs				
Five-Year Site Review	1	ea	$15,000.00	$ 15,000
Subtotal Other O&M Direct Costs				$ 15,000
Present Worth O&M Direct Costs (30 yrs @ 7% discount rate)				$ 32,400
Total Present Worth O&M Costs (30 yrs @ 7% discount rate)				$ 32,400
Subtotal Cost Of Alternative				**$ 694,500**
Contingency (@ 20%)				$ 138,900
Total Cost Of Alternative				**$ 833,400**

Key to unit abbreviations

cy	cubic yard
ea	each
ls	lump sum
msf	thousand square feet
sample	per sample
sy	square yard
ton	per US ton

Table 2-9
SWMU 13 - Alternative 2: *Institutional Controls* Cost Estimate

Activity	Quantity	Unit	Unit Cost	Total Cost
Direct Capital Costs				
Land Use Controls	1	ea	$5,000.00	$ 5,000
Subtotal Direct Capital Costs				$ 5,000
Indirect Capital Costs				
Project Management (10% of direct costs)				-
Subtotal Indirect Capital Costs				-
Total Capital Costs				$ 5,000
Annual O&M Direct Costs				
Subtotal Annual O&M Direct Costs				
Other O&M Direct Costs				
Five-Year Site Review	1	ea	$15,000.00	$ 15,000
Subtotal Other O&M Direct Costs				$ 15,000
Present Worth O&M Direct Costs (30 yrs @ 7% discount rate)				$ 32,400
Total Present Worth O&M Costs (30 yrs @ 7% discount rate)				$ 32,400
Subtotal Cost Of Alternative				**$ 37,400**
Contingency (@ 20%)				-
Total Cost Of Alternative				**$ 37,400**

Key to unit abbreviations

ea	each

Table 2-10
SWMU 22 - Alternative 2: *Institutional Controls* Cost Estimate

Activity	Quantity	Unit	Unit Cost	Total Cost
Direct Capital Costs				
Land Use Controls	1	ea	$5,000.00	$ 5,000
Subtotal Direct Capital Costs				$ 5,000
Indirect Capital Costs				
Project Management (10% of direct costs)				-
Subtotal Indirect Capital Costs				-
Total Capital Costs				$ 5,000
Annual O&M Direct Costs				
Subtotal Annual O&M Direct Costs				-
Other O&M Direct Costs				
Five-Year Site Review	1	ea	$15,000.00	$ 15,000
Subtotal Other O&M Direct Costs				$ 15,000
Present Worth O&M Direct Costs (30 yrs @ 7% discount rate)				$ 32,400
Total Present Worth O&M Costs (30 yrs @ 7% discount rate)				$ 32,400
Subtotal Cost Of Alternative				**$ 37,400**
Contingency (@ 20%)				-
Total Cost Of Alternative				**$ 37,400**

Key to unit abbreviations

ea	each

Table 2-11
SWMU 36 - Alternative 2: *Institutional Controls* Cost Estimate

Activity	Quantity	Unit	Unit Cost	Total Cost
Direct Capital Costs				
Land Use Controls	1	ea	$5,000.00	$ 5,000
Subtotal Direct Capital Costs				$ 5,000
Indirect Capital Costs				
Project Management (10% of direct costs)				-
Subtotal Indirect Capital Costs				-
Total Capital Costs				$ 5,000
Annual O&M Direct Costs				
Subtotal Annual O&M Direct Costs				
Other O&M Direct Costs				
Five-Year Site Review	1	ea	$15,000.00	$ 15,000
Subtotal Other O&M Direct Costs				$ 15,000
Present Worth O&M Direct Costs (30 yrs @ 7% discount rate)				$ 32,400
Total Present Worth O&M Costs (30 yrs @ 7% discount rate)				$ 32,400
Subtotal Cost Of Alternative				**$ 37,400**
Contingency (@ 20%)				-
Total Cost Of Alternative				**$ 37,400**

Key to unit abbreviations

ea	each

2.13 STATUTORY DETERMINATIONS

CERCLA Section 121, requires that selected remedies are protective of human health and the environment, comply with ARARs, are cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment to permanently and significantly reduce the toxicity, mobility, or volume of hazardous wastes. Table 2-12 highlights how the selected remedies meet these statutory requirements.

Section 121 (c) of CERCLA and the NCP provide the statutory and legal bases for conducting 5-year reviews. Because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure, a review of such remedial action will occur no less often than each 5 years after the initiation of such action to ensure that human health and the environment are protected.

2.14 DOCUMENTATION OF SIGNIFICANT CHANGES FROM THE PREFERRED ALTERNATIVE IN THE PROPOSED PLAN

The Proposed Plan for OUs 4 and 8 was released for public comment on January 14, 2000. The Army reviewed all written and verbal comments submitted during the public comment period. It was determined that there is a significant change to the remedy for SWMU 6 and 8, as originally identified in the Proposed Plan. A comment from the Utah Department of Environmental Quality indicated that soil treated by solidification/stabilization may not be land-disposed at either SWMU 6 or 8. Based on this comment, the Army, EPA and State of Utah agreed that treated soil should be disposed of in a designated CAMU. Please see Section 3.0 for a summary of the comments received. Also, Appendix A is the transcript of the public meeting held February 1, 2000.

TABLE 2-12

Statutory Determination

SWMU 6	
Preferred Alternative	Excavation and solidification/stabilization
Protects Human Health and the Environment	This alternative provides overall protection of human health and the environment by preventing contact with lead-contaminated soil, removing contamination from the site, and treating the contaminated soil.
Complies With ARARs	This alternative complies with all ARARs.
Cost Effectiveness	This alternative has the best cost/benefit ratio.
Uses Permanent Solutions	This alternative represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, *excavation, solidification/stabilization, and land use restrictions* provide the best balance of trade-offs in terms of the balancing criteria. This alternative reduces the risks to hypothetical future residents or construction workers associated with the contaminated soil. It is effective over the long term. Land use restrictions prevent the completion of exposure pathways and further reduce risk. In addition, 5- year site reviews monitor changes in SWMU conditions. This alternative also reduces the mobility of contaminants in soil by immobilizing them and reducing the potential for direct contact with contaminants. Health and environmental concern over the short-term are negligible because the implementation time is very short and the materials required for implementation of this alternative are readily available.
Treatment as Principal Element	By treating the contaminated soils by solidification/stabilization and off-post treatment and disposal, this alternative addresses principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of this alternative, the statutory preference for remedies that employ treatment as a principal element is satisfied.
ARARs	RCRA Land Disposal Regulations Phase IV; Federal Register, May 26, 1998
	Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities; 40 CFR 264
	Corrective Action for Solid Waste Management Units 40 CFR 264 (Subpart S)
	Staging Piles Rule; 40 CFR 264.554
	Alternative LDR treatment standards for contaminated soil; 40 CFR 268.49
	Military Munitions Rule: Hazardous Waste Identification and Management; 40 CFR 266 Subpart M
	Utah General Requirements for Air Conservation; Rule 307-101
	Utah Emissions Standards: Fugitive Emissions and Fugitive Dust; Rule 307-205
	Utah Conditions for Issuing Approval Orders; Rule 307-401-6
	Utah Corrective Action Cleanup Standards Policy; Rule 311-211
	Utah General Requirements – Identification and Listing of Hazardous Waste; Rule 315-2
	Utah Hazardous Waste Generator Requirements; Rule 315-5
	Utah Standards for Facility Owners and Operators; Rule 315-8
	Utah General Facility Standards: Location Standards for Hazardous Waste Facilities; Rule 315-8-2.9
	Utah General Facility Standards: construction Quality Assurance Program; Rule 315-8-2.10
	Utah Groundwater Protection; Rule 315-8-6
	Utah Closure/Post-Closure Standards; Rule 315-8-7

TABLE 2-12 (cont'd)

SWMU 6 (cont'd)	
ARARs (cont'd)	Utah Use and Management of Containers; Rule 315-8-9
	Utah Tanks; Rule 315-8-10
	Utah Waste Piles; Rule 315-8-12
	Utah Landfills; Rule 315-8-14
	Utah Use of Corrective Action Management Units; Rule 315-8-21
	Utah Land Disposal Restrictions; Rule 315-13
	Utah Cleanup Action and Risk-Based Closure Standards; Rule 315-101
	Utah Solid Waste Facility Location Standards, General Facility Requirements; Rule 315-302
	Utah Industrial Solid Waste Facility Requirements; Rule 315-304
	Utah Facility Standards for Piles Used for Storage and Treatment; Rule 315-314
	Utah Standards of Quality for Waters of the State; Rule 317-2, Section 317-2-3, Antidegradation Policy
	Utah Groundwater Protection; Rule 317-6
	Utah Pollutant Discharge Elimination System; Rule 317-8, Section 317-8-8 Pretreatment requirements
	Endangered Species Act of 1973; 16 U.S. Code 1531, et seq.
	Endangered and Threatened Wildlife and Plants; 50 CFR 17
	Archaeological and Paleotontological Resources Protection Act (ARPA) of 1979; 36 CFR 29 et seq.
TBCs	Biological Assessment; 50 CFR 402.12
	EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities; July 14, 1994

TABLE 2-12 (cont'd)

SWMU 8	
Preferred Alternative	Excavation and solidification/stabilization
Protects Human Health and the Environment	This alternative provides overall protection of human health and the environment by preventing contact with lead-contaminated soil, removing contamination from the site, and treating the contaminated soil.
Complies With ARARs	This alternative complies with all ARARs.
Cost Effectiveness	This alternative has the best cost/benefit ratio.
Uses Permanent Solutions	This alternative represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner for the SWMU. Of those alternatives that are protective of human health and the environment and comply with ARARs, *excavation, solidification/stabilization, and land use restrictions* provide the best balance of trade-offs in terms of the balancing criteria. This alternative reduces the risks to hypothetical future residents associated with the contaminated soil. It is effective over the long term. Land use restrictions prevent the completion of exposure pathways and further reduce risk. In addition, 5- year site reviews monitor changes in SWMU conditions. This alternative also reduces the mobility of contaminants in soil by immobilizing them and reducing the potential for direct contact with contaminants. Health and environmental concern over the short-term are negligible because the implementation time is very short and the materials required for implementation of this alternative are readily available.
Treatment as Principal Element	By treating the contaminated soils by solidification/stabilization and off-post treatment and disposal, this alternative addresses principal threats posed by the site through the use of treatment technologies. By utilizing treatment as a significant portion of this alternative, the statutory preference for remedies that employ treatment as a principal element is satisfied.
ARARs	RCRA Land Disposal Regulations Phase IV, Federal Register, May 26, 1998
	Standards for Owners and Operation of Hazardous Waste Treatment Storage and Disposal Facilities; 40 CFR 264
	Corrective Action for Solid Waste Management Units 40 CFR 264 (Subpart S)
	Staging Piles Rule; 40 CFR 264.554
	Alternative LDR treatment standards for contaminated soil; 40 CFR 268.49
	Military Munitions Rule: Hazardous Waste Identification and Management; 40 CFR 266, Subpart M
	Utah General Requirements for Air Conservation; Rule 307-101
	Utah Emissions Standards: Fugitive Emissions and Fugitive Dust; Rule 307-205
	Utah Conditions for Issuing Approval Orders; Rule 307-401-6
	Utah Corrective Action Cleanup Standards Policy; Rule 311-211
	Utah General Requirements – Identification and Listing of Hazardous Waste; Rule 315-2
	Utah Hazardous Waste Generator Requirements; Rule 315-5
	Utah Standards for Facility Owners and Operators; Rule 315-8
	Utah General Facility Standards: Location Standards for Hazardous Waste Facilities; Rule 315-8-2.9
	Utah General Facility Standards: Construction Quality Assurance Program; Rule 315-8-2.10
	Utah Groundwater Protection; rule 315-8-6
	Utah Closure/Post-Closure Standards; Rule 315-8-7
	Utah Use and Management of Containers; rule 315-8-9
	Utah Tanks; Rule 315-8-10

TABLE 2-12 (cont'd)

SWMU 8 (cont'd)	
ARARs (cont'd)	Utah Waste Piles; Rule 315-8-12
	Utah Landfills; Rule 315-8-14
	Utah Use of Corrective Action Management Units and Temporary Units; Rule 315-8-21
	Utah Land Disposal Restrictions; Rule 315-13
	Utah Cleanup Action and Risk-Based Closure Standards; Rule 315-101
	Utah Solid Waste Facility Location Standards, General Facility Requirements; Rule 315-302
	Utah Industrial Solid Waste Facility Requirements; Rule 315-304
	Utah Facility Standards for Piles Used for Storage and Treatment; Rule 315-314
	Utah Standards of Quality for Waters of the State; Rule 317-2, Section 317-2-3, Antidegradation Policy
	Utah Groundwater Protection; Rule 317-6
	Utah Pollutant Discharge Elimination System; Rule 317-8, Section 317-8-8 Pretreatment requirements
	Endangered Species Act of 1973; 16 U.S. Code 1531, et seq.
	Endangered and Threatened Wildlife and Plants; 50 CFR 17
	Archaeological and Paleotontological Resources Protection Act (ARPA) of 1979; 36 CFR 29 et seq.
TBCs	Biological Assessment; 50 CFR 402.12
	EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities; July 14, 1994

TABLE 2-12 (cont'd)

SWMU 13	
Preferred Alternative	Institutional controls
Protects Human Health and the Environment	This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use.
Complies With ARARs	This alternative complies with all ARARs.
Cost Effectiveness	This alternative meets all requirements at a minimal cost.
Uses Permanent Solutions	This alternative represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner for the SWMU. Of those alternatives that are protective of human health and the environment and comply with ARARs, *institutional controls in the form of land use restrictions* provide the best balance of trade-offs in terms of the balancing criteria. This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use. This alternative provides long-term and permanent prevention of future residential use. In addition, 5- year site reviews monitor changes in SWMU conditions. This alternative has no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 13.
Treatment as Principal Element	This remedy utilizes permanent solutions to the maximum extent practicable for the SWMU. However, because treatment of the principal threat of the SWMU was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The fact that there are no unacceptable cancer risks or hazards identified for Depot workers at SWMU 13 precludes a remedy in which contaminants could be excavated and treated effectively.
ARARs	Utah Corrective Action Cleanup Standards Policy, Rule 311-211
	Utah Cleanup Action and Risk Based Closure Standards; Rule 315-101
	Utah Groundwater Protection; Rule 317-6
	Endangered Species Act of 1973; 16 U.S. Code 1531, et seq.
	Endangered and Threatened Wildlife and Plants; 50 CFR 17
TBCs	Biological Assessment; 50 CFR 402.12
	EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities; July 14, 1994

TABLE 2-12 (cont'd)

SWMU 22	
Preferred Alternative	Institutional controls
Protects Human Health and the Environment	This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use.
Complies With ARARs	This alternative complies with all ARARs.
Cost Effectiveness	This alternative meets all requirements at a minimal cost.
Uses Permanent Solutions	This alternative represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner for the SWMU. Of those alternatives that are protective of human health and the environment and comply with ARARs, *institutional controls in the form of land use restrictions* provide the best balance of trade-offs in terms of the balancing criteria. This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use. This alternative provides long-term and permanent prevention of future residential use. In addition, 5- year site reviews monitor changes in SWMU conditions. This alternative has no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 22.
Treatment as Principal Element	This remedy utilizes permanent solutions to the maximum extent practicable for the SWMU. However, because treatment of the principal threat of the SWMU was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The fact that there are no unacceptable cancer risks or hazards identified for Depot workers at SWMU 22 precludes a remedy in which contaminants could be excavated and treated effectively.
ARARs	Utah Corrective Action Cleanup Standards Policy, Rule 311-211
	Utah Cleanup Action and Risk Based Closure Standards; Rule 315-101
	Utah Groundwater Protection; Rule 317-6
	Endangered Species Act of 1973; 16 U.S. Code 1531, et seq.
	Endangered and Threatened Wildlife and Plants; 50 CFR 17
TBCs	Biological Assessment; 50 CFR 402.12
	EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities; July 14, 1994

TABLE 2-12 (cont'd)

SWMU 36	
Preferred Alternative	Institutional controls
Protects Human Health and the Environment	This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use.
Complies With ARARs	This alternative complies with all ARARs.
Cost Effectiveness	This alternative meets all requirements at a minimal cost.
Uses Permanent Solutions	This alternative represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner for the SWMU. Of those alternatives that are protective of human health and the environment and comply with ARARs, *institutional controls in the form of land use restrictions* provide the best balance of trade-offs in terms of the balancing criteria. This alternative provides overall protection of human health and the environment because land use restrictions prevent residential use. This alternative provides long-term and permanent prevention of future residential use. In addition, 5- year site reviews monitor changes in SWMU conditions. This alternative has no adverse effects on the community or onsite workers. No unacceptable cancer risks or hazards were identified for Depot workers at SWMU 36.
Treatment as Principal Element	This remedy utilizes permanent solutions to the maximum extent practicable for the SWMU. However, because treatment of the principal threat of the SWMU was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The fact that there are no unacceptable cancer risks or hazards identified for Depot workers at SWMU 36 precludes a remedy in which contaminants could be excavated and treated effectively.
ARARs	Utah Corrective Action Cleanup Standards Policy, Rule 311-211
	Utah Cleanup Action and Risk Based Closure Standards; Reg., Rule 315-101
	Utah Groundwater Protection; Rule 317-6
	Endangered Species Act of 1973; 16 U.S. code 1531, et seq.
	Endangered and Threatened Wildlife and Plants; 50 CFR 17
TBCs	Biological Assessment; 50 CFR 402.12
	EPA Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities; July 14, 1994

3.0 RESPONSIVENESS SUMMARY

The Remedial Investigation was released to the public on February 1997. The Feasibility Study was released to the public on December 20, 1999. The Proposed Plan was released to the public January 14, 2000. These documents are available in the Administrative Record and in information repositories maintained in the Public Affairs Office at TEAD, the Tooele Public Library, the Grantsville Public Library, and the Marriott Library at the University of Utah. The notice of availability of these documents was published in the Deseret News and in the Transcript Bulletin on January 11 and 18, 2000. A public comment period on the Proposed Plan was held from January 14, 2000, through February 14, 2000. In addition, a public meeting was held on February 1, 2000, at the Tooele County courthouse. At this meeting, representatives from TEAD, EPA, and UDEQ discussed with the public the preferred alternatives for the two operable units containing eight SWMUs under consideration.

Only one written comment was received during the public comment period and that was from the Utah Department of Environmental Quality (UDEQ). This Responsiveness Summary addresses comments received during the public meeting and the public comment period. The comments are summarized and responses provided as applicable. Please see Appendix A for the complete transcript of the public meeting.

Public Comment 1

Should we be concerned about leaching that might have occurred during the lag time between finding contamination at TEAD and the clean up process? Do we have a bigger area than when first investigated?

Response to Public Comment 1

The contaminants found to be of concern at TEAD are metals and pesticides. Both of these constituents are not very mobile in water or soil, so leaching is not of concern. We should not expect there to be a larger area of contamination than when first investigated.

Public Comment 2

Specifically looking at SWMU 35, how can there be two areas of pesticide contamination if the pesticides are not moving with water?

Response to Public Comment 2

Large amounts of pesticides were being spread in this residential area and the pesticide contamination is found in the high organic materials in the ditch. However, contamination was never found any further downstream. Excavation and off-post

treatment and disposal is the recommended alternative for SWMU 35, and it includes confirmatory sampling to make sure that contaminants have not spread.

UDEQ Comment 1

The ROD needs to clarify how compliance with ARARs will be achieved for remedies involving excavation and solidification/stabilization.

If a Corrective Action Management Unit (CAMU) is established at sites where excavation and solidification/stabilization will occur, then excavation, treatment and redeposition of waste material can be accomplished inside the CAMU without violating land disposal restrictions. This would also provide more flexibility in designing a closure remedy, since land disposal does not occur and the standards for closure/post closure and landfill closure would be relevant and appropriate, allowing the implementation of a hybrid landfill closure. A permeable cover to address the direct contact threat can be installed as part of such a closure if the residual contamination poses no threat to ground water. (For a description of hybrid landfill closures, please see the EPA guidance document entitled RCRA ARARs: Focus on Closure Requirements, Directive 9234.2-04FS, October 1989.)

Table 2-17 lists the CAMU rule (UAC R315-8-21) as an ARAR for SWMUs 6 and 8, but if Tooele Army Depot plans to use the CAMU concept to address on-site soil remediation, the text of the ROD has to define the CAMU and explain how it will be used.

Response UDEQ Comment 1

The Final ROD text is revised to clarify how compliance with ARARs will be achieved for the solidification/stabilization remedies. The ROD text will be revised to state that the lead contaminated soil at SWMUs 6 and 8 will be excavated, treated by solidification/stabilization, and then placed in a Corrective Action Management Unit (CAMU) but not returned to the excavation area at each SWMU after treatment. Treatment standards listed in 40 CFR 268.49(c) for land disposal, requirements for closure/post closure (UAC R315-8-7) and landfill closure (UAC R315-8-14) are, therefore, relevant and appropriate rather than applicable, because CAMUs are not considered land disposal units. The LDR treatment standards are not applicable to wastes disposed of in CAMUs.

The Final ROD is also revised to indicate that the proposed CAMU is designated as part of the Sanitary Landfill/Pesticide Disposal Area (SWMU 12/15). An area in the south-central portion of the approximately 120-acre landfill is proposed as the CAMU location. (Currently, the proposed corrective action at SWMU 12/15 is an evapotranspiration cover, groundwater monitoring, and land use controls. This corrective action is equivalent, if not more stringent than a hybrid landfill closure as recommended by the reviewer for the CAMU.) It is extremely unlikely that the treated

soil in the CAMU will pose a threat to groundwater; however, lead may be added to the groundwater monitoring parameters established at SWMU 12/15, as deemed necessary.

Table 2-17 of the final ROD is revised and the CAMU rule (UAC R315-8-21) will be listed as applicable rather than relevant and appropriate. Also, text is added to the ROD to define a CAMU and explain how it will be used for disposal.

The changes made to the ROD as a result of this comment will not be made to the Final Feasibility Study or the Proposed Plan for OUs 4 and 8. The Army, EPA, and UDEQ have approved these documents.

4.0 REFERENCES

Allied Technology Group, Inc., 1998. *Voluntary Interim Action Report, SWMU 7, Open Trench, and SWMU 22, Washout Pond, Tooele Army Depot, Utah*, August 1988.

Dames & Moore, 1999. Final Feasibility Study Report, Operable Units 4 and 8, Tooele Army Depot, Tooele, Utah, April 1999.

Radkiewicz, R. J., 1995. "Memorandum on Command Policy on Establishing Remediation Goals and Objectives at U.S. Army Industrial Operations Command (IOC) Installations," U.S. Department of the Army, Headquarters, IOC, October 10, 1995.

Rust E&I, 1997a. *Revised Final Remedial Investigation Addendum Report for Operable Units 4, 8, and 9*, prepared for USAEC, Aberdeen Proving Ground, Maryland, February 1997.

Rust E&I, 1997b. *Tooele Army Depot - Final Site-Wide Ecological Risk Assessment*, prepared for USAEC, Aberdeen Proving Ground, Maryland, October 1997.

SACE (Sacramento District, U.S. Army Corps of Engineers), 1997. *Voluntary Interim Cleanup Plan*.

Tooele County Economic Development Corporation, 1995. *Tooele Army Depot Conversion and Reuse Plan, Tooele, Utah*.

U.S. Army, 1998. Memorandum, "Army Guidance on Using Institutional Controls (ICs) in the CERCLA Process," David A. Whaley, Assistant Chief of Staff for Installation Management, to MACOMs and installation managers, September 4, 1998.

USATHAMA (U.S. Army Toxic and Hazardous Materials Agency), 1979. *Installation Assessment of Tooele Army Depot*, Report No. 141.

USEPA, 1992. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance*, EPA/530-R-93-003, Office of Solid Waste, July 1992.

USEPA, 1991a. *Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals)*, Office of Emergency and Remedial Response, Publication 9285.7-01B, December 1991.

USEPA, 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, OSWER Directive 9355.3-01, Office of Emergency and Remedial Response, Washington, D.C., October 1988.

USEPA, 1999. A Guide to Preparing Superfund Proposed Plans, Records of Decisions, and Other Remedy Selection Decision Documents, EPA 540-R-98-031, OSWER 9200.1-238, July 1999.

Utah, 1994. "Utah Hazardous Waste Management Rules," *Utah Administrative Code (UAC)*, R315-1 to R315-9, R315-12 to R315-14, R315-50, and R315-101, Utah Solid and Hazardous Waste Control Board, Utah Department of Environmental Quality, Division of Solid and Hazardous Waste; revised November 15, 1994.

APPENDIX A

Transcript of Tooele Army Depot

Public Meeting

BLANK PAGE

ERRATA

Certain errors were made in the transcription of the public meeting. The following are corrections for those errors:

Page	For	Read
14, line 7	site	alternative
15, line 8	burns	berms
17, line 5	free agent	reagent
23, line 6	leeching	leaching
25, line 21	incredimentally	incrementally

PUBLIC MEETING

PROPOSED PLAN

OPERABLE UNITS 4 & 8

DATE:	February 1, 2000
TIME:	6:30 p.m.
PLACE HELD:	Tooele County Courthouse 47 South Main Stree Tooele, Utah 84074

COPY

MELINDA J. ANDERSEN
CSR No. 281

INDEPENDENT REPORTING
AND VIDEOGRAPHY

Certified Shorthand Reporters

1220 Beneficial Life Tower
36 South State Street
Salt Lake City, Utah 84111
(801) 538-2333

PROCEEDINGS

February 1, 2000

MR. McFARLAND: We would like to welcome everyone out tonight. For any of you who may not know me, my name is Larry McFarland. I'm the restoration program manager at Tooele Army Depot. We're meeting here tonight for the purpose of presenting to the public for comment remedies or proposed remedies that we are looking at to instituting eight sites of Tooele Army Depot.

The intent of this meeting is to gather information from the public, to gain opinions on the work we're doing at these sites and we'll move forward based on public input as well as regulatory input as to what the remedy will be at each site.

Tonight on the agenda Dames & Moore, who is under contract with the Army to do all the alternative analysis for our sites. In other words, they're looking at the different technologies and remedies and methods that can be implemented at each site to do the required response actions. So we'll have a presentation from Rosa Gwinn and Sarah Gettier.

Rosa will speak somewhat generically on how we got to where we are today, what activities have been completed in each one of these site, not at these sites, but what activities have been completed on the depot, the work that's been done to get us to the point of where we are

proposing a remedy for these sites.

Sarah will present a more specific presentation on each one of the sites, the detail of what has been found at each site as far as contamination, the alternatives that were looked at as well as the alternative that we are proposing for the sites.

We'll then have a question and answer period. On the agenda we have that scheduled for 15 minutes. Don't let that stop anybody from asking questions. We intend on staying until everyone has had their own questions answered.

For those who may not want to ask their questions tonight or feel uncomfortable speaking in a public forum, we have some cards that we put together where you can just identify your name, what organization you may be representing, it has a place for your address, mailing address so we can provide responses to you or other mailings in the future. So you can write your questions on this as well if you don't feel comfortable speaking and you can give these to myself or Randi Nelson here on the front row after the meeting.

One thing we would like everyone to do as this is a public meeting for the public record, if you would like to comment during the comment period asking questions that you provide your name and your affiliation with an agency organization you may be representing or if you are just a

citizen or public individual identify yourself as a public participant.

With that I will turn the time over to Rosa who will provide an overview of what got us to the point that we're at today.

MS. GWINN: I think everyone who has gotten a flyer or seen on the poster knows that this is a public meeting and we're discussing a proposed plan for operable units 4 and 8.

Perhaps the first thing I should mention is what an operable unit is or what that means. Operable unit is really in a way a bookkeeping term. It's a way that the Environmental Protection Agency, the EPA, has designated for collecting sites, environmental sites of concern and handling them as a group. So an operable unit is a group of environmental sites.

We're talking clearly today about operable units 4 and 8. I think mathematically most people would probably figure out that means there are other operable units at the facility, and there in fact are.

Larry has had a meeting in the past for a proposed plan for solutions or remedies at operable units 5, 6, 7 and 10. We're not going to be talking about those operable units today. And for those who might be curious operable units 1, 2 and 3 are empty. They were just set

aside for use if necessary. But today we're going to focus on operable units 4 and 8.

As I mentioned those operable units contain sites. The sites that we're going to be talking about are listed here. They're also indicated by number on the overhead on the right hand side of the scene. Operable unit 4 contains three sites. You'll see at the end there is another code or acronym SWMU. We call that a SWMU. It's a solid waste management unit. That's fundamentally an environmental site that people are concerned with. So for example, the first site in operable unit 4 is the former transformer boxing area, SWMU 31, site 31.

Operable unit 4 like I said has three sites in it and operable unit 8 has five sites in it. I'm not going to describe those in detail here because that's what Sarah will be providing later in her talk. But just for your information these are the eight sites in the two operable units.

In the next slide I provide sort of a list of milestones. What has gotten us to the point where we are even having this proposed planning meeting. The first step is the Tooele Army Depot, which we have abbreviated here as TEAD, was put on a Superfund National Priorities List in 1990. I think most people are familiar with the term Superfund. It's an Environmental Protection Agency or

federal program for dealing with environmental and hazardous waste. So when Tooele was put on the Superfund list, sites had to be looked at and characterized.

The next item is unrelated to environmental concerns, although it is pertinent to what we're going to be talking about today, and that is the fact that part of Tooele Army Depot has been transferred from military ownership under a program called Base Realignment and Closure program or BRAC. That was completed in 1995. And at Tooele Army Depot, the BRAC portion of the base was transferred in December of 1998. It might be a little bit difficult to see on the overhead on the right, but the BRAC parcel is that upper area on the right hand side with numerous roads in it as well as the small rhombus in the corner. It's pretty apparent there are two sites in the BRAC parcel.

Then the next item I have listed here is the process for OUs 4 and 8 under the Comprehensive Environmental Response, Compensation and Liability Act, or CERCLA. CERCLA is the same as Superfund. Those are synonyms.

So what has happened on OUs 4 and 8, operable units 4 and 8 that brings us to this point? The first report that went out was the remedial investigation. It represents the results of actual investigations at the site that were performed in the past.

Remedial investigation reports of what was found

when samples were collected was sent off to a laboratory and analyzed for chemical components. The chemical components that are found if they don't belong there could be called contaminants. So the remedial investigation is designed to identify the source and the location of contaminants.

The other thing the remedial investigation does is pretty important to the whole decision making process, and it calculates risks related to contaminants. The way it does that is it looks at the contaminants, sees how concentrated it is at the site and then it looks at the toxicological information to see how dangerous this contaminant is to human beings. It combines those two pieces of information with information on how long people are going to be exposed to that material. So there is an exposure component of the risk assessment.

The risk assessment that was performed for the remedial investigation looked at exposure to residents who might be living at the site or who might in the future live at the site. Residents tend to live someplace for a very long period of time, often children live there, perhaps somebody might be growing a garden there. All of these things are taken into this consideration.

It also considered exposure scenarios for a depot worker because most of these sites are still on the depot. The depot worker usually works for a shorter period of time

than a resident might live at the site. The depot worker is there fore ten hours a day, four days a week. And all of this information is rolled into a risk assessment.

It also looked at a construction worker. That is somebody who probably doesn't work at the site for a long period of time, maybe 30 days or 90 days, but who because of what they're doing could be exposed to subsurface soil, digging a ditch, installing a utility line or something of that nature.

That's the risk assessment for human health. There is another risk assessment stage that takes place and that is the ecological risk assessment. That is using the same information about contamination and toxicity and looks at how that might affect animals or plants that live or grow at the site.

Those two pieces of information, the human health risk assessment and the ecological risk assessment and the contamination that were identified in those risk assessments is used in the next step, which is the feasibility study. The feasibility study was completed as you can see in December of 1999. It's an engineering document. It describes how you might clean up the sites that the risk assessment indicates is a problem. The feasibility study helps you identify remediation or clean up alternatives.

The proposed plan provides the same information,

but it's really a public document. It's less engineering oriented and it's really designed to transfer this information to the public in a way it can be understood so that what we've done up to now can really be evaluated by the public, because the public participation is an important point of this process.

In fact that's the point we're at right now. Between a proposed plan and this record of decision we need to look at community examples. The record of decision hasn't been completed. That's because we need feedback from the community, but the record of decision is different from these other documents because it's actually a legal document. It establishes that this the best way that we can clean up a site.

So the next stage after that clearly hasn't been completed either and that's the design stage. Once we've identified exactly how and what kind of technology we want to use to clean up the sites, actually gets to the nuts and bolts, how many backhoes are needed and where do they need to be acquired and that sort of thing.

I should mention that throughout this whole process, even though I've indicated that this is an EPA Superfund program, this has been a cooperative effort including work by the Army, by the EPA, by the State of Utah. And regulations both state and federal apply and all these

documents have been put forward through a cooperative effort of the Army and the federal and state agencies.

I talked a little bit about the feasibility study, saying that's where we evaluate the alternative. I think it's useful to point out what criteria are used in evaluating the alternatives.

So we have the site. We know the contaminants. We know the risk information. Then the engineering document says what are the best ways we might consider to clean this up. And it takes each one of those options, each one of those remedial alternatives and evaluates it for these nine criteria. Is it protective for human health and environment? Does it comply with regulatory requirements both state and federal? Is it effective in the long term? Does it reduce the toxicity, the mobility or volume of the contamination of the site? Is it effective in the short time? Is it implementable? Has it been done before? And of course what is the cost of the alternative?

State acceptance is part of why we're here. Although that's been provided through approval of the documents, but community acceptance is really the final step. And that's not evaluated in the documents. That will be in the record of decision.

So that having been said I think I can turn the floor over to Sarah Gettier. She is going to provide detail

information about the sites.

MS. GETTIER: As Rosa mentioned we have eight sites to cover tonight. I want to give you an overview of how I'm going to present the information for each SWMU. I'm going to begin with a site summary, which includes a history, risks or hazards that were found in the risk assessment and any contaminants of concern that were found at the site. Contaminants of concern are any chemicals or compounds found in the soil above remediation goals. I'll also list the alternatives in the feasibility study.

We might have evaluated a couple of alternatives or six alternatives and I will list the alternatives. You'll notice up on the slide that I'll have the alternatives and then next to it I'll also include the cost. As Rosa just mentioned we have nine evaluation criteria. The is just up here for your information. And lastly, I'll tell you what our preferred alternative is after evaluating and looking at all the evaluation criteria.

Let's begin with the first site. The former transformer boxing area, SWMU 31. This is located in the eastern side of the base. This site was used for the temporary storage of transformers. It is a flat gravel covered area and it measures about 625 feet by 300 feet. Currently this site is in the BRAC parcel, which means it is no longer military property.

The risk assessment was performed at this site and they found unacceptable residential risks, but it was acceptable for industrial worker. And there were no contaminants of concern identified for industrial use. So in the feasibility study we evaluated two alternatives for this site, the no action alternative and institutional controls.

No action alternative is required by EPA and it acts as a baseline to compare it. What would happen if we didn't do anything at this site and simply walked away? And then institutional controls is kind of a catch all term. It encompasses many different things. It could include a fence around the affected area, signs posted so nobody could get to that area, or in this case deed restrictions.

To explain deed restrictions, let's say somebody wanted to build a building at SWMU 31. They would need a permit to do so. They would come down to the county courthouse and apply for that permit and they would see in the deed that there would be a statement restricting the site for any residential use.

Institutional controls also include a five year site review. That's to assess any changes in the SWMU conditions. I would like to point out that I go over several alternatives for the other sites, and every alternative includes this five year site review except for the no action alternative. And you'll recall that we have residential

risks at SWMU 31. So our recommended alternative is institutional controls.

The next site is the PCB spill site, SWMU 32. That's located in the eastern portion of the base also. This site is the location of a transformer spill that occurred in 1980. Approximately 1,000 gallons of PCB contaminated soil spilled at this site. The contaminated soil was excavated and removed and properly disposed of. This site is also in the BRAC portion just like SWMU 31. I want to explain that during our remedial investigation many samples were taken of this site. We looked not just for PCB, but other contaminants because no PCBs were found at this site, but we did find a metal, arsenic.

The risk assessment found unacceptable residential risks from this arsenic at levels below comprehensive background concentrations. That's a long term. Exactly what does that mean? That means we've done a lot of characterization out at the site and we've looked at samples everywhere. We've looked at the arsenic levels all over the base. And if you look at the arsenic levels all over the base compared to the arsenic levels found at SWMU 32, they were within expected range because arsenic is naturally occurring. For that matter if we had to do the risk assessment over at this site, we wouldn't even include arsenic in our risk assessment.

So we have no contaminants of concern that were identified at this site for any use, whether it be residential or industrial. In the feasibility study we evaluated two alternatives also, no action and institutional controls. Because this site is clean for all uses no action is the recommended alternative.

The next site is the wastewater spreading area, SWMU 35. You'll notice it's down in the southeastern portion of TEAD. This site is the first site that is not in the BRAC parcel. This is currently military property. The site collected wastewater from a former residential complex on the base. It included a series of ditches and trenches where the water spread to a spreading area.

The risk assessment was performed at this site and we found unacceptable residential risks. These were from pesticides found in the surface soil. We also had acceptable depot worker risks. This is the first site where we had unacceptable ecological risks as well. And those were also from the pesticides in the surface soil. So clearly pesticides are our contaminants of concern at this site. On the slide the pesticides were found in high concentration in the area of red.

For the feasibility study we evaluated three alternatives at this site. The no action alternative which you're familiar with and institutional controls. Remember I

said that came in many different forms? Because this site is still military property it's in the form of land use restrictions. Tooele Army Depot has a master land use plan. So if anybody wanted to do anything in SWMU 35 they would first check with the master land use plan where it would have a statement restricting the use for residential property.

The next site is excavation and off-post treatment disposal. This is a new alternative. That's where we would actually excavate the contamination located in red on the slide and take it off post either to a landfill of a treatment storage and disposal facility where they would determine the appropriate treatment for the pesticide contaminants in the soil.

Because of the pesticide contamination we have at this site we recommend excavation and off-site treatment and disposal. But also remember that we have the unacceptable residential risks. So that alternative also includes the land use restrictions.

I'm all done with operable unit 4 and we're moving on to operable unit 8. The first site is the old burn area, SWMU 6. This site was used for the testing of munitions and burning boxes and wooden crates either on the ground or in trenches at this site. You'll notice this is down in the south central portion of TEAD.

The risk assessment found unacceptable

residential risks at this site as well. But we also have unacceptable risks to a construction worker. That's from lead found in the subsurface. We had acceptable depot worker risks at this site. We also have two contaminants of concern. We have a site map and I want to paint you a picture of the site which you can see up there. We have the lead contaminated soil which in an area where there are four burns. And then we have 2,4-DNT located in the drainage gully of the norther portion of the site.

So we need to figure out how we're going to deal with those contaminants of concern, the lead and the 2,4-DNT. We looked at no action, institutional controls which is the form of land use restrictions and also a fence around the two affected areas.

The next alternative we evaluated was the soil cover. That's where we would take approximately a foot of clean soil and place it over the two affected areas and then also place a fence around those areas. The next alternative was off-post treatment and disposal where we would excavate both of those contaminants separately and take them off post to a regulated facility for disposal.

I would like to point out, I forgot to mention that these are not the only alternatives. We had six alternatives that we evaluated, but there are just four on this slide and two more that are coming up. That's soil

washing and solidification stabilization. These two alternatives are a little bit more complicated so I want to take some time over here on the right hand side and explain a little bit more detail soil washing.

Also I would like to point out that both of these alternatives are proven technologies for the lead contaminated soil only. So when I'm talking about these alternatives I'm talking about the lead contaminated soil. Both of these alternatives would include excavating the 2,4-DNT and taking it off post for treating and disposal.

But for the lead contaminated soil by soil washing that's where we would excavated the lead contaminated soil and then we need to separate the material into coarse and fine grain fractions. Why do we need to do that? That's because the lead contamination is found in the fine grain particles of the soil. We do that by a series of screening the soil. We take dry screens and we remove large rocks or debris found in the soil. And then we have wet screens where it actually separates the coarse soil and fine particles. I believe we do confirmation sampling and return the clean soil to the site and take the material that had the lead in it off post for treatment.

I would like to point out, too, that a treatability study is needed at this site. That's conducted to evaluate the effectiveness of doing soil washing on the

specific soil at SWMU 6.

The next alternative is solidification stabilization. That's where we excavate the lead contaminated soil. We also treat that on site, but this time we're using a cement base free agent. What does that mean? That means we take the contaminated soil and we mix it with cement and the cement binds the particles of lead to the cement mixture so then nobody can come in contact with the lead contaminated soil.

And then we return the stabilized soil. The lead is not going anywhere. It's stabilized in this cement mixture and we return that to the SWMU as backfill. About a foot of clean soil is placed on top of that and then the site is graded and revegetated back to its original condition. And also a treatability study would be needed with this technology as well.

Let me draw your attention back to the original slide and tell you that solidification stabilization is our recommended alternative at this site. When we went through those evaluation criteria, the highest rank alternative looked at. It's a proven technology. We know it works for lead. And it's cost effective and it meets our remediation goals.

The next site is the small arms firing range, SWMU 8. This is located along the western portion of TEAD.

This was a firing range used for small arms training. For those of you who are not familiar with the firing range, we have one area where people stand and shoot at targets. And in this case we have a bermed area in front of the targets and then also we have a bermed area behind the targets basically to catch the shot that people miss, that miss the target.

Here we found unacceptable residential risks. That was due to the lead. Those bermed areas I was talking about we also call bullet stop areas. We had acceptable depot worker risks. We also have unacceptable ecological risks and that is also due to the lead in the soil.

So lead is our contaminant of concern at this site and we need to figure out how we're to clean up the lead at this site. The lead you can see on this picture is located in the red areas. I would also like to point out that the lead at the site is at concentrations nearly 1,000 times the naturally occurring areas. It's a pretty contaminated site.

So we need to figure out how we're going to deal with this. Here we look at six alternatives in the feasibility study. There are four on this slide. The no action, institutional controls, a soil cover which I mentioned before is the placing of a soil cover around those affected areas with a fence and land use restrictions,

off-post treatment and disposal where we could excavate the lead contaminated soil and also soil washing and solidification stabilization.

I explained to you in detail what both of these alternatives are, but I would like to point out that here we only have lead contaminated soil. So we don't need to worry about the 2,4-DNT like we had at SWMU 6.

Also we have lead in two different forms. We have lead contamination in the soil and then we also have lead shot or bullet fragments. So for these alternatives for the soil washing we would excavate, use the screening procedure to remove the lead shot from the soil and then we would take the lead contaminated soil off site for disposal and implement land restrictions for the residential risks. Solidification stabilization, as you'll recall we would excavate the lead contaminated soil, mix it with cement, bind the lead to the cement mixture, place if back in the site so it's stabilized and also implement land restrictions.

So here the recommendation is, solidification stabilization. It's our most cost effective alternative. It's a proven technology for the lead. And it meets our remediation goals. I just want to point out that this site will be usable for military purposes.

The next site is the tire disposal area, SWMU 13. This is an 11 acre pit located in the southern portion of

TEAD. This former gravel pit was used for the disposal of used tires. All the tires have been properly removed. There is no longer anything at the site now. If you go out to look at it or were to drive out to it now it's an open field. The risk assessment was performed at this site and found unacceptable residential risks and acceptable depot worker risks. No contaminants of concern were identified for military use at this site.

For the feasibility study we evaluated no action and institutional controls. And because of those residential risks we recommended implementing institutional controls at this site.

The next site is building 1303 washout pond, SWMU 22. It's located down in the south central portion of TEAD. Building 1303 was a munitions dismantling facility that dismantled high explosive firearms and projectiles. The wash water from this building likely contained explosives which drained from this building to a ponding area.

The Army Corps of Engineers conducted an interim removal action at this site and actually removed the soil that had explosives in the soil at this site. Confirmation sampling was done at the site to make sure we've cleaned up the explosives to our remediation goals. About 100 tons of soil was taken off post for treatment and disposal and it was done by incineration.

And then the risk assessment was done. And I just want to point out that the risk assessment was recalculated using the results from this removal action. We found unacceptable residential risks and acceptable depot worker risks. The residential risks were because we evaluated the whole site and the removal action just occurred in one small part of that. We also found no contaminants of concern for military use at this site.

We evaluated two alternatives, no action and institutional controls. Because we have the residential risks that I mentioned earlier institutional controls is our recommended alternative.

This is the final SWMU in operable unit 8. The old burn staging area, SWMU 36. That's located in the south central portion of TEAD very close to SWMU 6 because it used to store material that was to be burned or disposed of at SWMU 6. The risk assessment was performed here and found unacceptable residential risks and acceptable depot worker risks.

At this site we had one contaminant of concern. It was one lead detection found just slightly above clean up goals. That was one isolated sample. There wasn't lead all over the site, just one sample. So we evaluated two alternatives at this site, no action and institutional controls. And to prevent residential use institutional

controls was our recommended alternative.

That was a lot of sites so I just I want to summarize what I discussed tonight. We have no action recommended at SWMU 32, which was the PCB spill site in the BRAC parcel. We have institutional controls for SWMUs 31, 13, 22 and 36. We recommend excavation and off-post treatment and disposal for SWMU 35. As you'll recall that's where we have the pesticide contamination. We recommended solidification stabilization at both SWMU 6 and SWMU 8 for the lead contaminated soil.

That concludes my presentation and I'm going to turn the floor over to Mr. Larry McFarland for the question and answer session.

MR. McFARLAND: We would like to now open the meeting for public comment or questions that Sarah, Rosa and I will field those questions. With us tonight in the audience as well we do have representatives from the EPA Region 8 and the State of Utah. If anyone has any specific questions for them they'll be more than happy to address those as well.

Once again if you would like to comment or ask a question, please state your name and affiliation for the public record, if not as I mentioned we do have the cards available that you can provide written comments to us after the meeting. With that are there any questions or comment?

MR. SHINTON: Harry Shinton, Tooele County Sheriff's Office. Rosa mentioned during the investigation of 1997 there were areas discovered to be contaminated. My question is with the lag time between the investigation and we haven't turned a shovel full of dirt yet, what is the leeching process on the contaminants? Do we have a bigger area than the investigation first discovered and because of the lag time that was taken has the contaminated area increased?

MS. GWINN: I'd be happy to answer that. Most of the contaminants that we talked about are metals and those really do not move very much in soil. In fact they really don't move at all. They're generally not soluble in water, especially lead which we've talked about. So leeching of metals is really of no concern. So the time period that has past really wouldn't have caused any changes with the lead at any of these sites.

The pesticides at SWMU 35, pesticides are designed to grab on to organic material. A pesticide is designed to go into a rat or a mouse or something and grab on to the fat in that animal. That's how it stays in there to kill it. That's why pesticides are very toxic. The same thing happens when pesticides are in the soil. They grab on to organic matter in the soil. And they're not really very mobile in water. They hold on to the fat and the pesticides

actually don't move around much.

The last thing that comes to mind is the 2,4-DNT. There is no longer a source of 2,4-DNT at SWMU 6. So you can't make any more 2,4-DNT than what you've already got. It's within a drainage gully. And although it may have transported slightly down gradient, this drainage gully is pretty flat. So it's not like we're talking about massive erosion or anything of that nature. It may well have moved, but probably not very far.

And one thing that has to happens when they perform the clean up is we have to take samples at the edge of where we removed or excavated the 2,4-DNT in this example. And if we take samples and those have 2,4-DNT we have to tak that dirt and then take more confirmatory samples. And if those have 2,4-DNT we have to take that dirt and take more confirmatory samples. So if there were leeching or movement of materials this confirmatory sampling allows us to characterize while we're doing the clean up whether we've gotten everything, whether it moved upstream, downstream, side gradient, that sort of thing.

So yes, I think your concern is definitely valid. I think it's not really a major concern for most of the contaminants that we've talked about today.

MR. SHINTON: I specifically address the SWMU 35 as you addressed. If you could put that slide back up. I

want to see it again because based on your definition as I recall there were two areas that had to be excavated, the red up to the top by the culvert and back down. Those two areas there and back have to be excavated?

MS. GWINN: That's right.

MR. SHINTON: How then based on your definition if we have two separate areas if it's not moving with water?

MS. GWINN: How it got there when pesticides were being used and there were large volumes, that's how it got there. The reason it -- this is downstream. You'll notice it's not down here. The minute it hit these high organic in the ditch it probably stuck to the soil.

So yes, it got there because it was in large amounts and was being spread in this residential area maybe to keep bugs or rats or what have you, maybe to keep weeds down, although I don't think -- I'm sure it was not for weeds because there were no herbicides found. But that material if it was very mobile the time in which it was released was way before 1997 and it really only got this far. We never found it any further downstream. It may have moved incredimentally. There is certainly that possibility, but that's where the confirmatory sampling is essential.

MR. SHINTON: Thank you.

MR. McFARLAND: Any other questions? Somebody has to have at least one more question. If there are no

further questions I guess we can continue on and close the public hearing.

Again, we do have the cards available, feel free to write any questions or comments you may have on the card and leave it with us tonight. If you would like to think about it a bit, mail comments in, some of the public notices and things we have addresses to mail give those to Randi or I. If you don't have those or haven't seen those get with us tonight and we can give you an E-mail address or mailing address to send addition comments up to through the comment period.

We also had a sign up register running around through the room. Has everyone had a chance to sign that. We would like to get everyone on that for our mailing list or responses to any comments. If there are no further questions I appreciate your attendance tonight and your interest in our program at Tooele. Thank you.

(The hearing concluded at 7:25 p.m.)

C E R T I F I C A T E

STATE OF UTAH)
:
COUNTY OF SALT LAKE)

I, Melinda J. Andersen, Certified Shorthand Reporter and Notary Public within and for the County of Salt Lake and State of Utah, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth, and were taken down by me in shorthand and thereafter transcribed into typewritten under my direction and supervision:

That the foregoing 26 pages contain a true and correct transcription of my shorthand notes so taken.

WITNESS MY HAND and official seal at Salt Lake City, Utah this 7th day of February, 2000.

My commission expires:
November 14, 2003

Melinda J. Andersen, C.S.R.

NOTARY PUBLIC
MELINDA J ANDERSEN
447 SKYLINE DR.
TOOELE, UT 84074
MY COMMISSION EXPIRES
NOVEMBER 14TH, 2003
STATE OF UTAH